Quiz 12

Solution

How many comparisons would be needed to sort an array containing 100 elements using ShortBubble

a. In the worst case? _____

b. In the best case? _____

Answer

a. 4950
b. 99

How many comparisons would be needed to sort an array contains 100 elements using SelectionSort if the original array values were already sorted?

a. 10,000
b. 9,900
c. 4,950
d. 99

Answer

c. 4950

A merge sort is used to sort an array of 1,000 test scores in descending order: Which of the following statements is true?

a. **The sort is fastest if the original test scores are sorted from smallest to largest.**
b. **The sort is fastest if the original test scores are in completely random order**
c. **The sort is fastest if the original test scores are sorted from largest to smallest**
d. **The sort is the same, no matter what the order of the original elements.**

Answer

d. The sort is the same, no matter what the order of the original elements.

A list is sorted from smallest to largest when a sort algorithm is called. Which of the following sorts would take the longest time to execute, and which would take the shortest?

a. **QuickSort (with the first element used as the split value)**
b. **ShortBubble**
c. **SelectionSort**
d. **HeapSort**
e. **InsertionSort**
f. **MergeSort**

Answer

QuickSort would take the longest; InsertionSort and ShortBubble would take the shortest.

Which sorting algorithm would you NOT use under the following conditions?

a. **The sort must be stable**
b. **Data are in descending order by key**
c. **Data are in ascending order by key**
d. **Space is very limited**

Answer

a. HeapSort
b. QuickSort or InsertionSort
c. QuickSort
d. MergeSort

Determine the Big-O measure for SelectionSort based on the number of elements moved rather than the number of comparisons

a. **For the best case**
b. **For the worst case**

Answer

a. O(1)
b. O(N)

Determine the Big-O measure for QuickSort based on the number of elements moved rather than the number of comparisons

a. **For the best case**
b. **For the worst case**

Answer

a. $O(1)$
b. $O(N^2)$

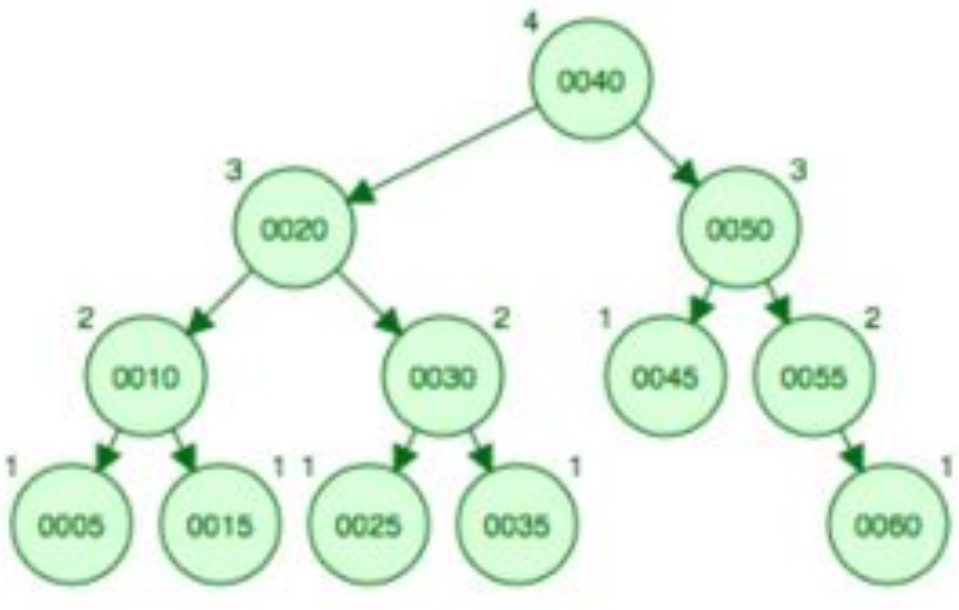
Consider the following elements:

5 10 15 20 25 30 35 40 45 50 55 60

a. **Insert each element into an initially empty AVL tree. Draw the tree at each insertion step and indicate any rotation operations that are applied to balance the tree**

Answer

a. There is a left rotation in the following insertions: 15, 25, 30, 40, 50, 55, 60. The resulting tree is:



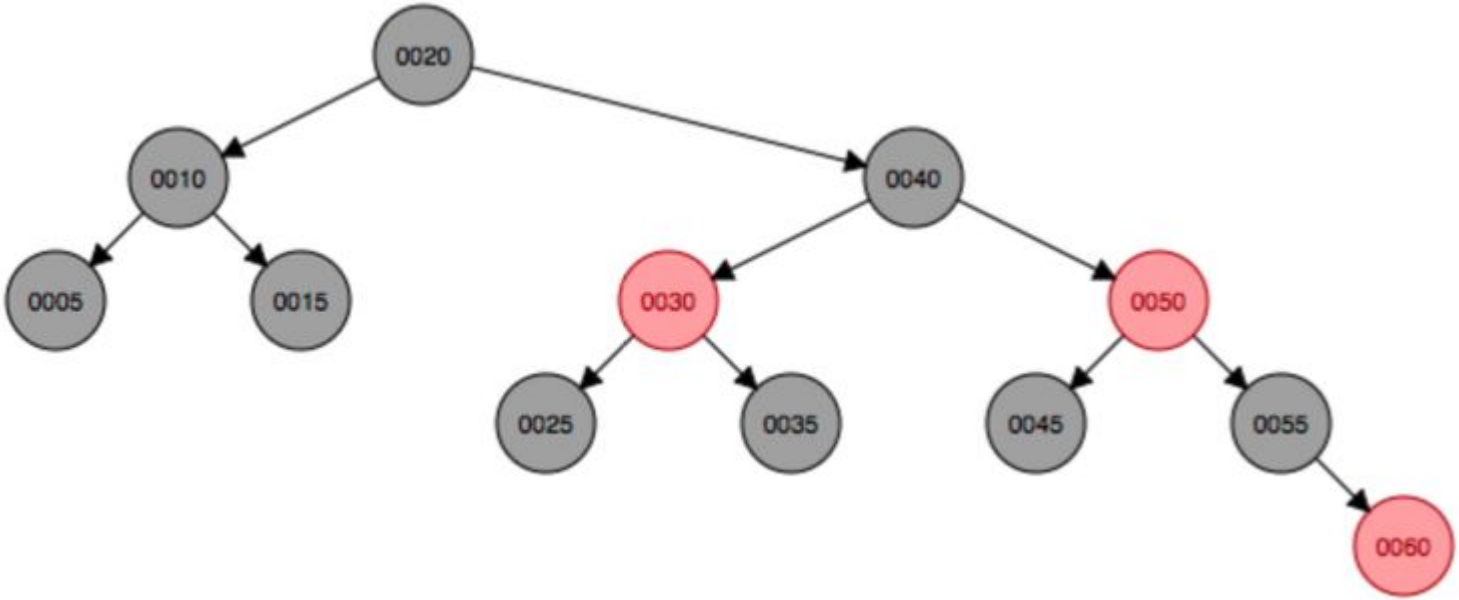
Consider the following elements:

5 10 15 20 25 30 35 40 45 50 55 60

b. Insert each element of an initially empty Red-Black tree. Draw the tree at each insertion step and indicated any application or recoloring and restructuring that occurs.

Answer

b.



Consider the following elements in insertion order for each of the trees Ti:

T1: 50 40 60 30 41 55 67 51 57 63 70 69 74

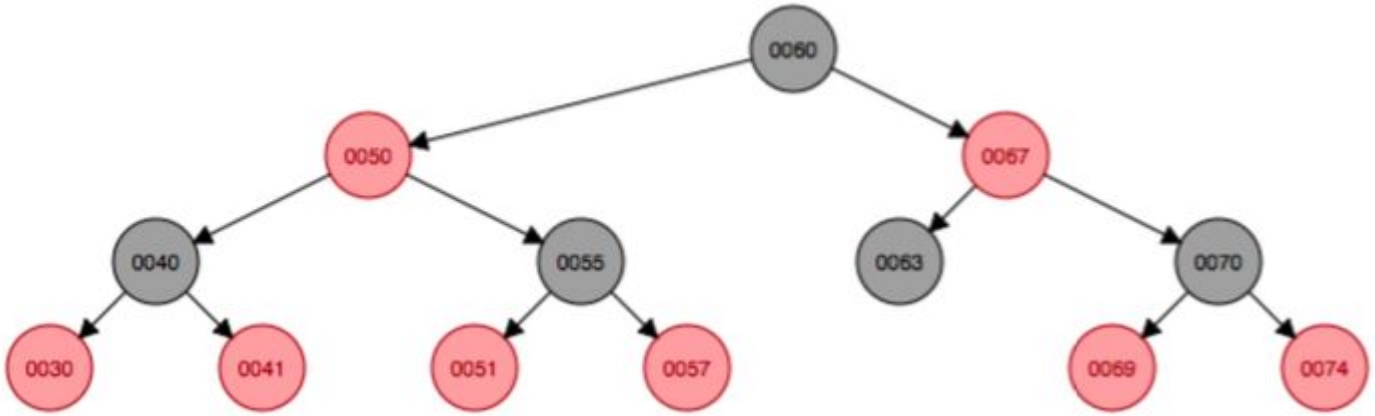
T2: 50 40 60 30 41 55 67 51 57 63 70

T3: 50 40 60 30 45 55 67 25 33 63 70

Draw each of these trees and color the nodes such that they are Red-Black trees. You can do this in text form and annotate the colors with a subscript of R or B.

Answer

T_1:



Consider the following elements in insertion order for each of the trees Ti:

T1: 50 40 60 30 41 55 67 51 57 63 70 69 74

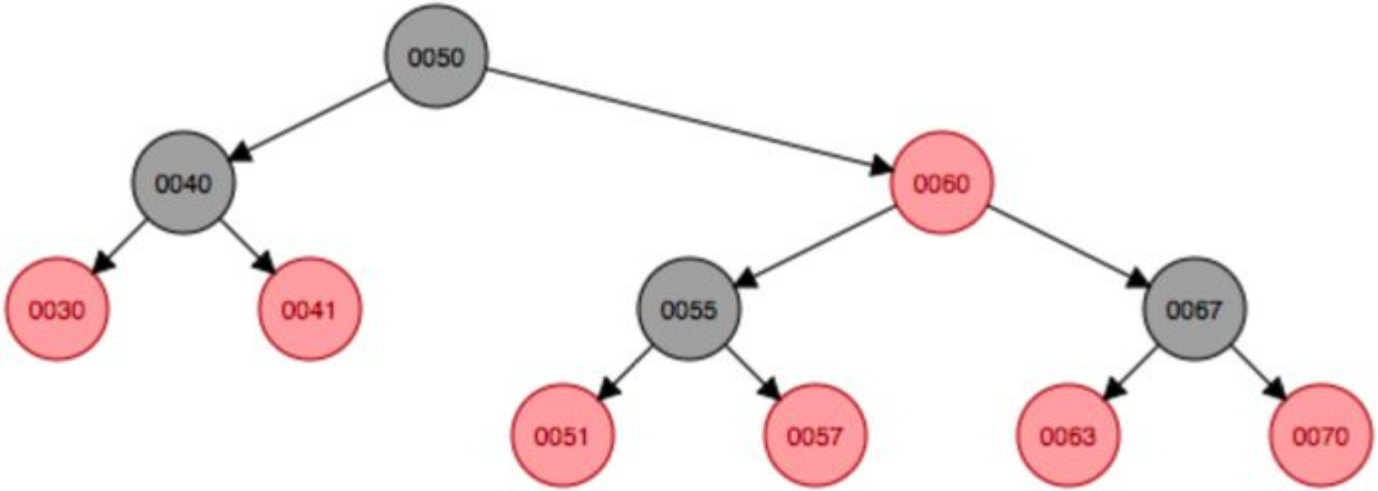
T2: 50 40 60 30 41 55 67 51 57 63 70

T3: 50 40 60 30 45 55 67 25 33 63 70

Draw each of these trees and color the nodes such that they are Red-Black trees. You can do this in text form and annotate the colors with a subscript of R or B.

Answer

T_2:



Consider the following elements in insertion order for each of the trees Ti:

T1: 50 40 60 30 41 55 67 51 57 63 70 69 74

T2: 50 40 60 30 41 55 67 51 57 63 70

T3: 50 40 60 30 45 55 67 25 33 63 70

Draw each of these trees and color the nodes such that they are Red-Black trees. You can do this in text form and annotate the colors with a subscript of R or B.

Answer

T_3: