***10 Successful Executions:-***

run:

100 contacts are:

9800000001 :-Equivalent 2 digit hashed value =37

9800000002 :-Equivalent 2 digit hashed value =60

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.

9800000098 :-Equivalent 2 digit hashed value =96

9800000099 :-Equivalent 2 digit hashed value =27

9800000100 :-Equivalent 2 digit hashed value =75

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Pivot Element=83

Sub-Array 1:

37 60 81 82 18 41 74 81 47 63 59 39 44 72 60 28 40 71 23 53 56 30 66 49 26 59 79 58 66 49 79 24 79 22 71 56 62 41 76 37 68 53 68 63 74 45 80 28 49 77 42 64 53 52 80 44 43 71 83 83 9 81 68 27 75

Sub-Array 2:

94 86 88 93 92 95 93 92 87 94 84 95 95 95 85 90 96 94 85 94 99 96 87 86 88 92 88 96 87 88 95 99 99 96

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Pivot Element=66

Sub-Array 1:

37 60 18 41 47 63 59 39 44 60 28 40 23 53 56 30 66 49 26 59 58 49 24 22 56 62 41 37 53 63 45 28 49 42 64 53 52 44 43 9 27

Sub-Array 2:

81 82 74 81 72 71 79 79 79 71 76 68 68 74 80 77 80 71 83 83 81 68 75

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Pivot Element=42

Sub-Array 1:

37 18 41 39 28 40 23 30 26 24 22 41 37 28 9 27

Sub-Array 2:

60 47 63 59 44 60 53 56 66 49 59 58 49 56 62 53 63 45 49 64 53 52 44 43

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Pivot Element=23

Sub-Array 1:

18 22 9

Sub-Array 2:

37 41 39 28 40 30 26 24 41 37 28 27

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Pivot Element=22

Sub-Array 1:

18 9

Sub-Array 2:

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Pivot Element=18

Sub-Array 1:

9

Sub-Array 2:

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Pivot Element=40

Sub-Array 1:

37 39 28 30 26 24 37 28 27

Sub-Array 2:

41 41

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Pivot Element=30

Sub-Array 1:

28 26 24 28 27

Sub-Array 2:

37 39 37

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-----------------------

Pivot Element=26

Sub-Array 1:

24

Sub-Array 2:

28 28 27

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Pivot Element=28

Sub-Array 1:

28 27

Sub-Array 2:

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Pivot Element=28

Sub-Array 1:

27

Sub-Array 2:

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Pivot Element=39

Sub-Array 1:

37 37

Sub-Array 2:

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Pivot Element=37

Sub-Array 1:

37

Sub-Array 2:

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Pivot Element=41

Sub-Array 1:

41

Sub-Array 2:

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-----------------------

Pivot Element=56

Sub-Array 1:

47 44 53 49 49 56 53 45 49 53 52 44 43

Sub-Array 2:

60 63 59 60 66 59 58 62 63 64

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Pivot Element=47

Sub-Array 1:

44 45 44 43

Sub-Array 2:

53 49 49 56 53 49 53 52

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Pivot Element=44

Sub-Array 1:

44 43

Sub-Array 2:

45

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Pivot Element=44

Sub-Array 1:

43

Sub-Array 2:

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-----------------------

Pivot Element=49

Sub-Array 1:

49 49

Sub-Array 2:

53 56 53 53 52

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Pivot Element=49

Sub-Array 1:

49

Sub-Array 2:

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-----------------------

Pivot Element=53

Sub-Array 1:

53 53 52

Sub-Array 2:

56

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-----------------------

Pivot Element=53

Sub-Array 1:

53 52

Sub-Array 2:

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Pivot Element=53

Sub-Array 1:

52

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=63

Sub-Array 1:

60 59 60 59 58 62 63

Sub-Array 2:

66 64

-----------------------

-----------------------

Pivot Element=62

Sub-Array 1:

60 59 60 59 58

Sub-Array 2:

63

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Pivot Element=59

Sub-Array 1:

59 58

Sub-Array 2:

60 60

-----------------------

-----------------------

Pivot Element=59

Sub-Array 1:

58

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=60

Sub-Array 1:

60

Sub-Array 2:

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Pivot Element=66

Sub-Array 1:

64

Sub-Array 2:

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-----------------------

Pivot Element=71

Sub-Array 1:

71 71 68 68 68

Sub-Array 2:

81 82 74 81 72 79 79 79 76 74 80 77 80 83 83 81 75

-----------------------

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Pivot Element=68

Sub-Array 1:

68 68

Sub-Array 2:

71 71

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-----------------------

Pivot Element=68

Sub-Array 1:

68

Sub-Array 2:

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-----------------------

Pivot Element=71

Sub-Array 1:

71

Sub-Array 2:

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-----------------------

Pivot Element=79

Sub-Array 1:

74 72 79 79 76 74 77 75

Sub-Array 2:

81 82 81 80 80 83 83 81

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-----------------------

Pivot Element=74

Sub-Array 1:

74 72

Sub-Array 2:

79 79 76 77 75

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Pivot Element=74

Sub-Array 1:

72

Sub-Array 2:

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-----------------------

Pivot Element=77

Sub-Array 1:

76 75

Sub-Array 2:

79 79

-----------------------

-----------------------

Pivot Element=76

Sub-Array 1:

75

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=79

Sub-Array 1:

79

Sub-Array 2:

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Pivot Element=81

Sub-Array 1:

81 80 80 81

Sub-Array 2:

82 83 83

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Pivot Element=81

Sub-Array 1:

80 80 81

Sub-Array 2:

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Pivot Element=80

Sub-Array 1:

80

Sub-Array 2:

81

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-----------------------

Pivot Element=82

Sub-Array 1:

Sub-Array 2:

83 83

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-----------------------

Pivot Element=83

Sub-Array 1:

83

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=88

Sub-Array 1:

86 88 87 84 85 85 87 86 88 88 87

Sub-Array 2:

94 93 92 95 93 92 94 95 95 95 90 96 94 94 99 96 92 96 95 99 99 96

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-----------------------

Pivot Element=86

Sub-Array 1:

84 85 85 86

Sub-Array 2:

88 87 87 88 88 87

-----------------------

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Pivot Element=85

Sub-Array 1:

84 85

Sub-Array 2:

86

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Pivot Element=84

Sub-Array 1:

Sub-Array 2:

85

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-----------------------

Pivot Element=87

Sub-Array 1:

87 87

Sub-Array 2:

88 88 88

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-----------------------

Pivot Element=87

Sub-Array 1:

87

Sub-Array 2:

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-----------------------

Pivot Element=88

Sub-Array 1:

88 88

Sub-Array 2:

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Pivot Element=88

Sub-Array 1:

88

Sub-Array 2:

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-----------------------

Pivot Element=95

Sub-Array 1:

94 93 92 95 93 92 94 95 95 90 94 94 92 95

Sub-Array 2:

96 99 96 96 99 99 96

-----------------------

-----------------------

Pivot Element=92

Sub-Array 1:

92 90 92

Sub-Array 2:

94 93 95 93 94 95 95 94 94 95

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-----------------------

Pivot Element=92

Sub-Array 1:

90 92

Sub-Array 2:

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-----------------------

Pivot Element=90

Sub-Array 1:

Sub-Array 2:

92

-----------------------

-----------------------

Pivot Element=94

Sub-Array 1:

93 93 94 94 94

Sub-Array 2:

95 95 95 95

-----------------------

-----------------------

Pivot Element=93

Sub-Array 1:

93

Sub-Array 2:

94 94 94

-----------------------

-----------------------

Pivot Element=94

Sub-Array 1:

94 94

Sub-Array 2:

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Pivot Element=94

Sub-Array 1:

94

Sub-Array 2:

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Pivot Element=95

Sub-Array 1:

95 95 95

Sub-Array 2:

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Pivot Element=95

Sub-Array 1:

95 95

Sub-Array 2:

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-----------------------

Pivot Element=95

Sub-Array 1:

95

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=96

Sub-Array 1:

96 96 96

Sub-Array 2:

99 99 99

-----------------------

-----------------------

Pivot Element=96

Sub-Array 1:

96 96

Sub-Array 2:

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Pivot Element=96

Sub-Array 1:

96

Sub-Array 2:

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Pivot Element=99

Sub-Array 1:

99 99

Sub-Array 2:

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Pivot Element=99

Sub-Array 1:

99

Sub-Array 2:

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Final sorted array:-

9 18 22 23 24 26 27 28 28 30 37 37 39 40 41 41 42 43 44 44 45 47 49 49 49 52 53 53 53 56 56 58 59 59 60 60 62 63 63 64 66 66 68 68 68 71 71 71 72 74 74 75 76 77 79 79 79 80 80 81 81 81 82 83 83 83 84 85 85 86 86 87 87 87 88 88 88 88 90 92 92 92 93 93 94 94 94 94 95 95 95 95 95 96 96 96 96 99 99 99

---------------------------------------

The Array of Pivots and leaf nodes:-

83 66 42 23 22 18 9 40 30 26 24 28 28 27 39 37 37 41 41 56 47 44 44 43 45 49 49 49 53 53 53 52 56 63 62 59 59 58 60 60 63 66 64 71 68 68 68 71 71 79 74 74 72 77 76 75 79 79 81 81 80 80 81 82 83 83 88 86 85 84 85 86 87 87 87 88 88 88 95 92 92 90 92 94 93 93 94 94 94 95 95 95 95 96 96 96 96 99 99 99

---------------------------------------

Converting the above array into B.S.T with Inorder Traversal as:-

9 18 22 23 24 26 27 28 28 30 37 37 39 40 41 41 42 43 44 44 45 47 49 49 49 52 53 53 53 56 56 58 59 59 60 60 62 63 63 64 66 66 68 68 68 71 71 71 72 74 74 75 76 77 79 79 79 80 80 81 81 81 82 83 83 83 84 85 85 86 86 87 87 87 88 88 88 88 90 92 92 92 93 93 94 94 94 94 95 95 95 95 95 96 96 96 96 99 99 99

The inorder traversal gives the result same as that of the sorted array by quick sort

Number of iteration := 68

BUILD SUCCESSFUL (total time: 1 second)

run:

100 contacts are:

9800000001 :-Equivalent 2 digit hashed value =52

9800000002 :-Equivalent 2 digit hashed value =80

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.

9800000099 :-Equivalent 2 digit hashed value =94

9800000100 :-Equivalent 2 digit hashed value =53

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Pivot Element=45

Sub-Array 1:

11 39 20 45 27 43 38 40 32 41 25 45 26 43 30 41 45 28 33 9 32 43 9 38

Sub-Array 2:

52 80 74 96 54 55 79 74 68 62 76 78 95 74 92 61 98 53 87 85 50 50 75 75 92 61 72 75 85 69 78 83 80 88 59 51 80 89 50 73 99 82 62 64 77 88 82 98 46 70 68 86 59 82 77 77 93 59 85 83 46 87 85 82 73 94 95 74 81 73 87 93 61 94 53

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-----------------------

Pivot Element=28

Sub-Array 1:

11 20 27 25 26 9 9

Sub-Array 2:

39 45 43 38 40 32 41 45 43 30 41 45 33 32 43 38

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Pivot Element=11

Sub-Array 1:

9 9

Sub-Array 2:

20 27 25 26

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Pivot Element=9

Sub-Array 1:

9

Sub-Array 2:

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-----------------------

Pivot Element=20

Sub-Array 1:

Sub-Array 2:

27 25 26

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Pivot Element=25

Sub-Array 1:

Sub-Array 2:

27 26

-----------------------

-----------------------

Pivot Element=27

Sub-Array 1:

26

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=33

Sub-Array 1:

32 30 32

Sub-Array 2:

39 45 43 38 40 41 45 43 41 45 43 38

-----------------------

-----------------------

Pivot Element=32

Sub-Array 1:

30 32

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=30

Sub-Array 1:

Sub-Array 2:

32

-----------------------

-----------------------

Pivot Element=39

Sub-Array 1:

38 38

Sub-Array 2:

45 43 40 41 45 43 41 45 43

-----------------------

-----------------------

Pivot Element=38

Sub-Array 1:

38

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=41

Sub-Array 1:

40 41

Sub-Array 2:

45 43 45 43 45 43

-----------------------

-----------------------

Pivot Element=40

Sub-Array 1:

Sub-Array 2:

41

-----------------------

-----------------------

Pivot Element=43

Sub-Array 1:

43 43

Sub-Array 2:

45 45 45

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-----------------------

Pivot Element=43

Sub-Array 1:

43

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=45

Sub-Array 1:

45 45

Sub-Array 2:

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Pivot Element=45

Sub-Array 1:

45

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=77

Sub-Array 1:

52 74 54 55 74 68 62 76 74 61 53 50 50 75 75 61 72 75 69 59 51 50 73 62 64 77 46 70 68 59 77 59 46 73 74 73 61 53

Sub-Array 2:

80 96 79 78 95 92 98 87 85 92 85 78 83 80 88 80 89 99 82 88 82 98 86 82 93 85 83 87 85 82 94 95 81 87 93 94

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-----------------------

Pivot Element=73

Sub-Array 1:

52 54 55 68 62 61 53 50 50 61 72 69 59 51 50 62 64 46 70 68 59 59 46 73 73 61 53

Sub-Array 2:

74 74 76 74 75 75 75 77 77 74

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-----------------------

Pivot Element=52

Sub-Array 1:

50 50 51 50 46 46

Sub-Array 2:

54 55 68 62 61 53 61 72 69 59 62 64 70 68 59 59 73 73 61 53

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-----------------------

Pivot Element=50

Sub-Array 1:

50 50 46 46

Sub-Array 2:

51

-----------------------

-----------------------

Pivot Element=50

Sub-Array 1:

50 46 46

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=46

Sub-Array 1:

46

Sub-Array 2:

50

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-----------------------

Pivot Element=59

Sub-Array 1:

54 55 53 59 59 53

Sub-Array 2:

68 62 61 61 72 69 62 64 70 68 73 73 61

-----------------------

-----------------------

Pivot Element=55

Sub-Array 1:

54 53 53

Sub-Array 2:

59 59

-----------------------

-----------------------

Pivot Element=53

Sub-Array 1:

53

Sub-Array 2:

54

-----------------------

-----------------------

Pivot Element=59

Sub-Array 1:

59

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=70

Sub-Array 1:

68 62 61 61 69 62 64 68 61

Sub-Array 2:

72 73 73

-----------------------

-----------------------

Pivot Element=62

Sub-Array 1:

62 61 61 61

Sub-Array 2:

68 69 64 68

-----------------------

-----------------------

Pivot Element=61

Sub-Array 1:

61 61

Sub-Array 2:

62

-----------------------

-----------------------

Pivot Element=61

Sub-Array 1:

61

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=68

Sub-Array 1:

64 68

Sub-Array 2:

69

-----------------------

-----------------------

Pivot Element=64

Sub-Array 1:

Sub-Array 2:

68

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-----------------------

Pivot Element=73

Sub-Array 1:

72 73

Sub-Array 2:

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-----------------------

Pivot Element=72

Sub-Array 1:

Sub-Array 2:

73

-----------------------

-----------------------

Pivot Element=75

Sub-Array 1:

74 74 74 75 75 74

Sub-Array 2:

76 77 77

-----------------------

-----------------------

Pivot Element=74

Sub-Array 1:

74 74 74

Sub-Array 2:

75 75

-----------------------

-----------------------

Pivot Element=74

Sub-Array 1:

74 74

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=74

Sub-Array 1:

74

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=75

Sub-Array 1:

75

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=77

Sub-Array 1:

76 77

Sub-Array 2:

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-----------------------

Pivot Element=76

Sub-Array 1:

Sub-Array 2:

77

-----------------------

-----------------------

Pivot Element=88

Sub-Array 1:

80 79 78 87 85 85 78 83 80 80 82 88 82 86 82 85 83 87 85 82 81 87

Sub-Array 2:

96 95 92 98 92 89 99 98 93 94 95 93 94

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-----------------------

Pivot Element=85

Sub-Array 1:

80 79 78 85 78 83 80 80 82 82 82 85 83 85 82 81

Sub-Array 2:

87 88 86 87 87

-----------------------

-----------------------

Pivot Element=82

Sub-Array 1:

80 79 78 78 80 80 82 82 82 81

Sub-Array 2:

85 83 85 83 85

-----------------------

-----------------------

Pivot Element=80

Sub-Array 1:

80 79 78 78 80

Sub-Array 2:

82 82 82 81

-----------------------

-----------------------

Pivot Element=78

Sub-Array 1:

78

Sub-Array 2:

80 79 80

-----------------------

-----------------------

Pivot Element=80

Sub-Array 1:

79 80

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=79

Sub-Array 1:

Sub-Array 2:

80

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-----------------------

Pivot Element=82

Sub-Array 1:

82 82 81

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=82

Sub-Array 1:

82 81

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=82

Sub-Array 1:

81

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=83

Sub-Array 1:

83

Sub-Array 2:

85 85 85

-----------------------

-----------------------

Pivot Element=85

Sub-Array 1:

85 85

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=85

Sub-Array 1:

85

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=87

Sub-Array 1:

86 87 87

Sub-Array 2:

88

-----------------------

-----------------------

Pivot Element=87

Sub-Array 1:

86 87

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=86

Sub-Array 1:

Sub-Array 2:

87

-----------------------

-----------------------

Pivot Element=96

Sub-Array 1:

95 92 92 89 93 94 95 93 94

Sub-Array 2:

98 99 98

-----------------------

-----------------------

Pivot Element=94

Sub-Array 1:

92 92 89 93 93 94

Sub-Array 2:

95 95

-----------------------

-----------------------

Pivot Element=92

Sub-Array 1:

92 89

Sub-Array 2:

93 93 94

-----------------------

-----------------------

Pivot Element=92

Sub-Array 1:

89

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=93

Sub-Array 1:

93

Sub-Array 2:

94

-----------------------

-----------------------

Pivot Element=95

Sub-Array 1:

95

Sub-Array 2:

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-----------------------

Pivot Element=98

Sub-Array 1:

98

Sub-Array 2:

99

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Final sorted array:-

9 9 11 20 25 26 27 28 30 32 32 33 38 38 39 40 41 41 43 43 43 45 45 45 45 46 46 50 50 50 51 52 53 53 54 55 59 59 59 61 61 61 62 62 64 68 68 69 70 72 73 73 73 74 74 74 74 75 75 75 76 77 77 77 78 78 79 80 80 80 81 82 82 82 82 83 83 85 85 85 85 86 87 87 87 88 88 89 92 92 93 93 94 94 95 95 96 98 98 99

---------------------------------------

The Array of Pivots and leaf nodes:-

45 28 11 9 9 20 25 27 26 33 32 30 32 39 38 38 41 40 41 43 43 43 45 45 45 77 73 52 50 50 46 46 50 51 59 55 53 53 54 59 59 70 62 61 61 61 62 68 64 68 69 73 72 73 75 74 74 74 74 75 75 77 76 77 88 85 82 80 78 78 80 79 80 82 82 82 81 83 83 85 85 85 87 87 86 87 88 96 94 92 92 89 93 93 94 95 95 98 98 99

---------------------------------------

Converting the above array into B.S.T with Inorder Traversal as:-

9 9 11 20 25 26 27 28 30 32 32 33 38 38 39 40 41 41 43 43 43 45 45 45 45 46 46 50 50 50 51 52 53 53 54 55 59 59 59 61 61 61 62 62 64 68 68 69 70 72 73 73 73 74 74 74 74 75 75 75 76 77 77 77 78 78 79 80 80 80 81 82 82 82 82 83 83 85 85 85 85 86 87 87 87 88 88 89 92 92 93 93 94 94 95 95 96 98 98 99

The inorder traversal gives the result same as that of the sorted array by quick sort

Number of iteration := 66

BUILD SUCCESSFUL (total time: 1 second)

run:

100 contacts are:

9800000001 :-Equivalent 2 digit hashed value =75

9800000002 :-Equivalent 2 digit hashed value =19

.

.

.

.

9800000099 :-Equivalent 2 digit hashed value =85

9800000100 :-Equivalent 2 digit hashed value =20

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-----------------------

Pivot Element=81

Sub-Array 1:

75 19 44 19 47 20 67 32 53 69 80 81 50 77 23 62 72 79 61 30 59 47 81 55 72 73 73 73 41 28 26 75 68 69 58 26 77 26 72 31 65 62 32 32 72 45 39 70 46 15 79 58 41 45 23 72 26 47 58 55 57 66 70 46 56 20

Sub-Array 2:

87 95 88 99 89 85 98 98 83 88 89 85 88 83 85 98 84 92 94 93 87 88 92 84 85 90 86 87 88 83 95 87 85

-----------------------

-----------------------

Pivot Element=53

Sub-Array 1:

19 44 19 47 20 32 50 23 30 47 41 28 26 26 26 31 32 32 45 39 46 15 41 45 23 26 47 46 20

Sub-Array 2:

75 67 69 80 81 77 62 72 79 61 59 81 55 72 73 73 73 75 68 69 58 77 72 65 62 72 70 79 58 72 58 55 57 66 70 56

-----------------------

-----------------------

Pivot Element=44

Sub-Array 1:

19 19 20 32 23 30 41 28 26 26 26 31 32 32 39 15 41 23 26 20

Sub-Array 2:

47 50 47 45 46 45 47 46

-----------------------

-----------------------

Pivot Element=26

Sub-Array 1:

19 19 20 23 26 26 26 15 23 20

Sub-Array 2:

32 30 41 28 31 32 32 39 41

-----------------------

-----------------------

Pivot Element=23

Sub-Array 1:

19 19 20 23 15 20

Sub-Array 2:

26 26 26

-----------------------

-----------------------

Pivot Element=19

Sub-Array 1:

19 15

Sub-Array 2:

20 23 20

-----------------------

-----------------------

Pivot Element=19

Sub-Array 1:

15

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=20

Sub-Array 1:

20

Sub-Array 2:

23

-----------------------

-----------------------

Pivot Element=26

Sub-Array 1:

26 26

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=26

Sub-Array 1:

26

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=32

Sub-Array 1:

32 30 28 31 32

Sub-Array 2:

41 39 41

-----------------------

-----------------------

Pivot Element=30

Sub-Array 1:

28

Sub-Array 2:

32 31 32

-----------------------

-----------------------

Pivot Element=31

Sub-Array 1:

Sub-Array 2:

32 32

-----------------------

-----------------------

Pivot Element=32

Sub-Array 1:

32

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=41

Sub-Array 1:

39 41

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=39

Sub-Array 1:

Sub-Array 2:

41

-----------------------

-----------------------

Pivot Element=45

Sub-Array 1:

45

Sub-Array 2:

47 50 47 46 47 46

-----------------------

-----------------------

Pivot Element=46

Sub-Array 1:

46

Sub-Array 2:

47 50 47 47

-----------------------

-----------------------

Pivot Element=50

Sub-Array 1:

47 47 47

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=47

Sub-Array 1:

47 47

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=47

Sub-Array 1:

47

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=72

Sub-Array 1:

67 69 62 61 59 55 72 68 69 58 72 65 62 72 70 58 72 58 55 57 66 70 56

Sub-Array 2:

75 80 81 77 79 81 73 73 73 75 77 79

-----------------------

-----------------------

Pivot Element=69

Sub-Array 1:

67 62 61 59 55 68 69 58 65 62 58 58 55 57 66 56

Sub-Array 2:

72 72 72 70 72 70

-----------------------

-----------------------

Pivot Element=57

Sub-Array 1:

55 55 56

Sub-Array 2:

67 62 61 59 68 69 58 65 62 58 58 66

-----------------------

-----------------------

Pivot Element=55

Sub-Array 1:

55

Sub-Array 2:

56

-----------------------

-----------------------

Pivot Element=62

Sub-Array 1:

62 61 59 58 58 58

Sub-Array 2:

67 68 69 65 66

-----------------------

-----------------------

Pivot Element=58

Sub-Array 1:

58 58

Sub-Array 2:

62 61 59

-----------------------

-----------------------

Pivot Element=58

Sub-Array 1:

58

Sub-Array 2:

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Pivot Element=62

Sub-Array 1:

61 59

Sub-Array 2:

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Pivot Element=61

Sub-Array 1:

59

Sub-Array 2:

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Pivot Element=68

Sub-Array 1:

67 65 66

Sub-Array 2:

69

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Pivot Element=67

Sub-Array 1:

65 66

Sub-Array 2:

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Pivot Element=65

Sub-Array 1:

Sub-Array 2:

66

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Pivot Element=70

Sub-Array 1:

70

Sub-Array 2:

72 72 72 72

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Pivot Element=72

Sub-Array 1:

72 72 72

Sub-Array 2:

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Pivot Element=72

Sub-Array 1:

72 72

Sub-Array 2:

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Pivot Element=72

Sub-Array 1:

72

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=73

Sub-Array 1:

73 73

Sub-Array 2:

75 80 81 77 79 81 75 77 79

-----------------------

-----------------------

Pivot Element=73

Sub-Array 1:

73

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=77

Sub-Array 1:

75 75 77

Sub-Array 2:

80 81 79 81 79

-----------------------

-----------------------

Pivot Element=75

Sub-Array 1:

75

Sub-Array 2:

77

-----------------------

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Pivot Element=79

Sub-Array 1:

79

Sub-Array 2:

80 81 81

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Pivot Element=80

Sub-Array 1:

Sub-Array 2:

81 81

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Pivot Element=81

Sub-Array 1:

81

Sub-Array 2:

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-----------------------

Pivot Element=85

Sub-Array 1:

83 85 83 85 84 84 85 83 85

Sub-Array 2:

87 95 88 99 89 98 98 88 89 88 98 92 94 93 87 88 92 90 86 87 88 95 87

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Pivot Element=84

Sub-Array 1:

83 83 84 83

Sub-Array 2:

85 85 85 85

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Pivot Element=84

Sub-Array 1:

83 83 83

Sub-Array 2:

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Pivot Element=83

Sub-Array 1:

83 83

Sub-Array 2:

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Pivot Element=83

Sub-Array 1:

83

Sub-Array 2:

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Pivot Element=85

Sub-Array 1:

85 85 85

Sub-Array 2:

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Pivot Element=85

Sub-Array 1:

85 85

Sub-Array 2:

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Pivot Element=85

Sub-Array 1:

85

Sub-Array 2:

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-----------------------

Pivot Element=88

Sub-Array 1:

87 88 88 88 87 86 87 88 87

Sub-Array 2:

95 99 89 98 98 89 98 92 94 93 92 90 95

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-----------------------

Pivot Element=87

Sub-Array 1:

87 86 87 87

Sub-Array 2:

88 88 88 88

-----------------------

-----------------------

Pivot Element=86

Sub-Array 1:

Sub-Array 2:

87 87 87

-----------------------

-----------------------

Pivot Element=87

Sub-Array 1:

87 87

Sub-Array 2:

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-----------------------

Pivot Element=87

Sub-Array 1:

87

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=88

Sub-Array 1:

88 88 88

Sub-Array 2:

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-----------------------

Pivot Element=88

Sub-Array 1:

88 88

Sub-Array 2:

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-----------------------

Pivot Element=88

Sub-Array 1:

88

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=92

Sub-Array 1:

89 89 92 90

Sub-Array 2:

95 99 98 98 98 94 93 95

-----------------------

-----------------------

Pivot Element=89

Sub-Array 1:

89

Sub-Array 2:

92 90

-----------------------

-----------------------

Pivot Element=92

Sub-Array 1:

90

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=98

Sub-Array 1:

95 98 98 94 93 95

Sub-Array 2:

99

-----------------------

-----------------------

Pivot Element=94

Sub-Array 1:

93

Sub-Array 2:

95 98 98 95

-----------------------

-----------------------

Pivot Element=95

Sub-Array 1:

95

Sub-Array 2:

98 98

-----------------------

-----------------------

Pivot Element=98

Sub-Array 1:

98

Sub-Array 2:

-----------------------

Final sorted array:-

15 19 19 20 20 23 23 26 26 26 26 28 30 31 32 32 32 39 41 41 44 45 45 46 46 47 47 47 50 53 55 55 56 57 58 58 58 59 61 62 62 65 66 67 68 69 69 70 70 72 72 72 72 72 73 73 73 75 75 77 77 79 79 80 81 81 81 83 83 83 84 84 85 85 85 85 85 86 87 87 87 87 88 88 88 88 88 89 89 90 92 92 93 94 95 95 98 98 98 99

---------------------------------------

The Array of Pivots and leaf nodes:-

81 53 44 26 23 19 19 15 20 20 23 26 26 26 32 30 28 31 32 32 41 39 41 45 45 46 46 50 47 47 47 72 69 57 55 55 56 62 58 58 58 62 61 59 68 67 65 66 69 70 70 72 72 72 72 73 73 73 77 75 75 77 79 79 80 81 81 85 84 84 83 83 83 85 85 85 85 88 87 86 87 87 87 88 88 88 88 92 89 89 92 90 98 94 93 95 95 98 98 99

---------------------------------------

Converting the above array into B.S.T with Inorder Traversal as:-

15 19 19 20 20 23 23 26 26 26 26 28 30 31 32 32 32 39 41 41 44 45 45 46 46 47 47 47 50 53 55 55 56 57 58 58 58 59 61 62 62 65 66 67 68 69 69 70 70 72 72 72 72 72 73 73 73 75 75 77 77 79 79 80 81 81 81 83 83 83 84 84 85 85 85 85 85 86 87 87 87 87 88 88 88 88 88 89 89 90 92 92 93 94 95 95 98 98 98 99

The inorder traversal gives the result same as that of the sorted array by quick sort

Number of iteration := 67

BUILD SUCCESSFUL (total time: 1 second)

run:

100 contacts are:

9800000001 :-Equivalent 2 digit hashed value =44

9800000002 :-Equivalent 2 digit hashed value =51

.

.

.

9800000099 :-Equivalent 2 digit hashed value =39

9800000100 :-Equivalent 2 digit hashed value =93

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Pivot Element=80

Sub-Array 1:

44 51 64 58 67 41 29 69 50 59 49 61 75 41 58 54 14 70 75 67 45 36 58 71 67 80 40 79 37 64 55 15 69 22 42 61 62 57 45 55 60 10 63 24 51 52 44 79 66 58 57 51 34 42 58 63 68 39

Sub-Array 2:

98 92 87 81 90 95 92 96 82 83 82 92 99 83 93 89 91 82 90 85 99 90 99 89 95 85 89 97 82 94 89 96 89 97 90 87 92 86 98 91 93

-----------------------

-----------------------

Pivot Element=58

Sub-Array 1:

44 51 58 41 29 50 49 41 58 54 14 45 36 58 40 37 55 15 22 42 57 45 55 10 24 51 52 44 58 57 51 34 42 39

Sub-Array 2:

64 67 69 59 61 75 70 75 67 71 67 80 79 64 69 61 62 60 63 79 66 63 68

-----------------------

-----------------------

Pivot Element=41

Sub-Array 1:

29 41 14 36 40 37 15 22 10 24 34 39

Sub-Array 2:

44 51 58 50 49 58 54 45 58 55 42 57 45 55 51 52 44 58 57 51 42

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-----------------------

Pivot Element=36

Sub-Array 1:

29 14 15 22 10 24 34

Sub-Array 2:

41 40 37 39

-----------------------

-----------------------

Pivot Element=15

Sub-Array 1:

14 10

Sub-Array 2:

29 22 24 34

-----------------------

-----------------------

Pivot Element=14

Sub-Array 1:

10

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=24

Sub-Array 1:

22

Sub-Array 2:

29 34

-----------------------

-----------------------

Pivot Element=29

Sub-Array 1:

Sub-Array 2:

34

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-----------------------

Pivot Element=37

Sub-Array 1:

Sub-Array 2:

41 40 39

-----------------------

-----------------------

Pivot Element=40

Sub-Array 1:

39

Sub-Array 2:

41

-----------------------

-----------------------

Pivot Element=51

Sub-Array 1:

44 51 50 49 45 42 45 51 44 42

Sub-Array 2:

58 58 54 58 55 57 55 52 58 57

-----------------------

-----------------------

Pivot Element=45

Sub-Array 1:

44 45 42 44 42

Sub-Array 2:

51 50 49 51

-----------------------

-----------------------

Pivot Element=44

Sub-Array 1:

44 42 42

Sub-Array 2:

45

-----------------------

-----------------------

Pivot Element=44

Sub-Array 1:

42 42

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=42

Sub-Array 1:

42

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=50

Sub-Array 1:

49

Sub-Array 2:

51 51

-----------------------

-----------------------

Pivot Element=51

Sub-Array 1:

51

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=55

Sub-Array 1:

54 55 52

Sub-Array 2:

58 58 58 57 58 57

-----------------------

-----------------------

Pivot Element=54

Sub-Array 1:

52

Sub-Array 2:

55

-----------------------

-----------------------

Pivot Element=57

Sub-Array 1:

57

Sub-Array 2:

58 58 58 58

-----------------------

-----------------------

Pivot Element=58

Sub-Array 1:

58 58 58

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=58

Sub-Array 1:

58 58

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=58

Sub-Array 1:

58

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=67

Sub-Array 1:

64 67 59 61 67 64 61 62 60 63 66 63

Sub-Array 2:

69 75 70 75 71 80 79 69 79 68

-----------------------

-----------------------

Pivot Element=64

Sub-Array 1:

64 59 61 61 62 60 63 63

Sub-Array 2:

67 67 66

-----------------------

-----------------------

Pivot Element=62

Sub-Array 1:

59 61 61 60

Sub-Array 2:

64 63 63

-----------------------

-----------------------

Pivot Element=61

Sub-Array 1:

59 61 60

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=61

Sub-Array 1:

59 60

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=59

Sub-Array 1:

Sub-Array 2:

60

-----------------------

-----------------------

Pivot Element=64

Sub-Array 1:

63 63

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=63

Sub-Array 1:

63

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=67

Sub-Array 1:

67 66

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=67

Sub-Array 1:

66

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=70

Sub-Array 1:

69 69 68

Sub-Array 2:

75 75 71 80 79 79

-----------------------

-----------------------

Pivot Element=69

Sub-Array 1:

69 68

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=69

Sub-Array 1:

68

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=75

Sub-Array 1:

75 71

Sub-Array 2:

80 79 79

-----------------------

-----------------------

Pivot Element=75

Sub-Array 1:

71

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=79

Sub-Array 1:

79

Sub-Array 2:

80

-----------------------

-----------------------

Pivot Element=92

Sub-Array 1:

87 81 90 92 82 83 82 92 83 89 91 82 90 85 90 89 85 89 82 89 89 90 87 92 86 91

Sub-Array 2:

98 95 96 99 93 99 99 95 97 94 96 97 98 93

-----------------------

-----------------------

Pivot Element=85

Sub-Array 1:

81 82 83 82 83 82 85 82

Sub-Array 2:

87 90 92 92 89 91 90 90 89 89 89 89 90 87 92 86 91

-----------------------

-----------------------

Pivot Element=82

Sub-Array 1:

81 82 82 82

Sub-Array 2:

83 83 85

-----------------------

-----------------------

Pivot Element=82

Sub-Array 1:

81 82 82

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=81

Sub-Array 1:

Sub-Array 2:

82 82

-----------------------

-----------------------

Pivot Element=82

Sub-Array 1:

82

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=83

Sub-Array 1:

83

Sub-Array 2:

85

-----------------------

-----------------------

Pivot Element=89

Sub-Array 1:

87 89 89 89 89 87 86

Sub-Array 2:

90 92 92 91 90 90 90 92 91

-----------------------

-----------------------

Pivot Element=87

Sub-Array 1:

87 86

Sub-Array 2:

89 89 89 89

-----------------------

-----------------------

Pivot Element=87

Sub-Array 1:

86

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=89

Sub-Array 1:

89 89 89

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=89

Sub-Array 1:

89 89

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=89

Sub-Array 1:

89

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=90

Sub-Array 1:

90 90 90

Sub-Array 2:

92 92 91 92 91

-----------------------

-----------------------

Pivot Element=90

Sub-Array 1:

90 90

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=90

Sub-Array 1:

90

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=91

Sub-Array 1:

91

Sub-Array 2:

92 92 92

-----------------------

-----------------------

Pivot Element=92

Sub-Array 1:

92 92

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=92

Sub-Array 1:

92

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=97

Sub-Array 1:

95 96 93 95 97 94 96 93

Sub-Array 2:

98 99 99 99 98

-----------------------

-----------------------

Pivot Element=96

Sub-Array 1:

95 93 95 94 96 93

Sub-Array 2:

97

-----------------------

-----------------------

Pivot Element=93

Sub-Array 1:

93

Sub-Array 2:

95 95 94 96

-----------------------

-----------------------

Pivot Element=95

Sub-Array 1:

95 94

Sub-Array 2:

96

-----------------------

-----------------------

Pivot Element=95

Sub-Array 1:

94

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=98

Sub-Array 1:

98

Sub-Array 2:

99 99 99

-----------------------

-----------------------

Pivot Element=99

Sub-Array 1:

99 99

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=99

Sub-Array 1:

99

Sub-Array 2:

-----------------------

Final sorted array:-

10 14 15 22 24 29 34 36 37 39 40 41 41 42 42 44 44 45 45 49 50 51 51 51 52 54 55 55 57 57 58 58 58 58 58 59 60 61 61 62 63 63 64 64 66 67 67 67 68 69 69 70 71 75 75 79 79 80 80 81 82 82 82 82 83 83 85 85 86 87 87 89 89 89 89 89 90 90 90 90 91 91 92 92 92 92 93 93 94 95 95 96 96 97 97 98 98 99 99 99

---------------------------------------

The Array of Pivots and leaf nodes:-

80 58 41 36 15 14 10 24 22 29 34 37 40 39 41 51 45 44 44 42 42 45 50 49 51 51 55 54 52 55 57 57 58 58 58 58 67 64 62 61 61 59 60 64 63 63 67 67 66 70 69 69 68 75 75 71 79 79 80 92 85 82 82 81 82 82 83 83 85 89 87 87 86 89 89 89 89 90 90 90 90 91 91 92 92 92 97 96 93 93 95 95 94 96 97 98 98 99 99 99

---------------------------------------

Converting the above array into B.S.T with Inorder Traversal as:-

10 14 15 22 24 29 34 36 37 39 40 41 41 42 42 44 44 45 45 49 50 51 51 51 52 54 55 55 57 57 58 58 58 58 58 59 60 61 61 62 63 63 64 64 66 67 67 67 68 69 69 70 71 75 75 79 79 80 80 81 82 82 82 82 83 83 85 85 86 87 87 89 89 89 89 89 90 90 90 90 91 91 92 92 92 92 93 93 94 95 95 96 96 97 97 98 98 99 99 99

The inorder traversal gives the result same as that of the sorted array by quick sort

Number of iteration := 66

BUILD SUCCESSFUL (total time: 0 seconds)

run:

100 contacts are:

9800000001 :-Equivalent 2 digit hashed value =33

9800000002 :-Equivalent 2 digit hashed value =94

.

.

.

9800000099 :-Equivalent 2 digit hashed value =94

9800000100 :-Equivalent 2 digit hashed value =7

---------------------------------------

-----------------------

Pivot Element=76

Sub-Array 1:

33 70 16 66 14 45 56 48 64 71 14 61 58 47 50 65 65 44 45 22 52 70 45 73 56 55 40 68 46 36 66 55 40 67 35 27 6 71 47 74 3 75 68 43 56 49 64 48 7

Sub-Array 2:

94 97 77 92 80 89 93 98 80 79 87 81 93 90 94 91 78 98 90 98 78 78 79 84 89 95 93 83 97 95 81 98 82 89 85 96 79 91 84 96 93 80 84 90 81 83 94 88 93 94

-----------------------

-----------------------

Pivot Element=61

Sub-Array 1:

33 16 14 45 56 48 14 58 47 50 44 45 22 52 45 56 55 40 46 36 55 40 35 27 6 47 3 43 56 49 48 7

Sub-Array 2:

70 66 64 71 65 65 70 73 68 66 67 71 74 75 68 64

-----------------------

-----------------------

Pivot Element=40

Sub-Array 1:

33 16 14 14 22 36 40 35 27 6 3 7

Sub-Array 2:

45 56 48 58 47 50 44 45 52 45 56 55 46 55 47 43 56 49 48

-----------------------

-----------------------

Pivot Element=14

Sub-Array 1:

14 6 3 7

Sub-Array 2:

33 16 22 36 40 35 27

-----------------------

-----------------------

Pivot Element=6

Sub-Array 1:

3

Sub-Array 2:

14 7

-----------------------

-----------------------

Pivot Element=14

Sub-Array 1:

7

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=33

Sub-Array 1:

16 22 27

Sub-Array 2:

36 40 35

-----------------------

-----------------------

Pivot Element=16

Sub-Array 1:

Sub-Array 2:

22 27

-----------------------

-----------------------

Pivot Element=22

Sub-Array 1:

Sub-Array 2:

27

-----------------------

-----------------------

Pivot Element=40

Sub-Array 1:

36 35

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=36

Sub-Array 1:

35

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=47

Sub-Array 1:

45 44 45 45 46 47 43

Sub-Array 2:

56 48 58 50 52 56 55 55 56 49 48

-----------------------

-----------------------

Pivot Element=45

Sub-Array 1:

44 45 45 43

Sub-Array 2:

46 47

-----------------------

-----------------------

Pivot Element=45

Sub-Array 1:

44 45 43

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=45

Sub-Array 1:

44 43

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=44

Sub-Array 1:

43

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=46

Sub-Array 1:

Sub-Array 2:

47

-----------------------

-----------------------

Pivot Element=55

Sub-Array 1:

48 50 52 55 49 48

Sub-Array 2:

56 58 56 56

-----------------------

-----------------------

Pivot Element=48

Sub-Array 1:

48

Sub-Array 2:

50 52 55 49

-----------------------

-----------------------

Pivot Element=55

Sub-Array 1:

50 52 49

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=50

Sub-Array 1:

49

Sub-Array 2:

52

-----------------------

-----------------------

Pivot Element=56

Sub-Array 1:

56 56

Sub-Array 2:

58

-----------------------

-----------------------

Pivot Element=56

Sub-Array 1:

56

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=68

Sub-Array 1:

66 64 65 65 68 66 67 64

Sub-Array 2:

70 71 70 73 71 74 75

-----------------------

-----------------------

Pivot Element=65

Sub-Array 1:

64 65 64

Sub-Array 2:

66 68 66 67

-----------------------

-----------------------

Pivot Element=65

Sub-Array 1:

64 64

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=64

Sub-Array 1:

64

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=66

Sub-Array 1:

66

Sub-Array 2:

68 67

-----------------------

-----------------------

Pivot Element=68

Sub-Array 1:

67

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=74

Sub-Array 1:

70 71 70 73 71

Sub-Array 2:

75

-----------------------

-----------------------

Pivot Element=70

Sub-Array 1:

70

Sub-Array 2:

71 73 71

-----------------------

-----------------------

Pivot Element=73

Sub-Array 1:

71 71

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=71

Sub-Array 1:

71

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=88

Sub-Array 1:

77 80 80 79 87 81 78 78 78 79 84 83 81 82 85 79 84 80 84 81 83

Sub-Array 2:

94 97 92 89 93 98 93 90 94 91 98 90 98 89 95 93 97 95 98 89 96 91 96 93 90 94 93 94

-----------------------

-----------------------

Pivot Element=80

Sub-Array 1:

77 80 79 78 78 78 79 79 80

Sub-Array 2:

87 81 84 83 81 82 85 84 84 81 83

-----------------------

-----------------------

Pivot Element=78

Sub-Array 1:

77 78 78

Sub-Array 2:

80 79 79 79 80

-----------------------

-----------------------

Pivot Element=77

Sub-Array 1:

Sub-Array 2:

78 78

-----------------------

-----------------------

Pivot Element=78

Sub-Array 1:

78

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=79

Sub-Array 1:

79 79

Sub-Array 2:

80 80

-----------------------

-----------------------

Pivot Element=79

Sub-Array 1:

79

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=80

Sub-Array 1:

80

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=81

Sub-Array 1:

81 81

Sub-Array 2:

87 84 83 82 85 84 84 83

-----------------------

-----------------------

Pivot Element=81

Sub-Array 1:

81

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=84

Sub-Array 1:

84 83 82 84 83

Sub-Array 2:

87 85

-----------------------

-----------------------

Pivot Element=83

Sub-Array 1:

82 83

Sub-Array 2:

84 84

-----------------------

-----------------------

Pivot Element=82

Sub-Array 1:

Sub-Array 2:

83

-----------------------

-----------------------

Pivot Element=84

Sub-Array 1:

84

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=87

Sub-Array 1:

85

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=95

Sub-Array 1:

94 92 89 93 93 90 94 91 90 89 95 93 89 91 93 90 94 93 94

Sub-Array 2:

97 98 98 98 97 98 96 96

-----------------------

-----------------------

Pivot Element=93

Sub-Array 1:

92 89 93 93 90 91 90 89 93 89 91 93 90

Sub-Array 2:

94 94 95 94 94

-----------------------

-----------------------

Pivot Element=90

Sub-Array 1:

89 90 89 89 90

Sub-Array 2:

92 93 93 91 93 91 93

-----------------------

-----------------------

Pivot Element=89

Sub-Array 1:

89 89

Sub-Array 2:

90 90

-----------------------

-----------------------

Pivot Element=89

Sub-Array 1:

89

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=90

Sub-Array 1:

90

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=92

Sub-Array 1:

91 91

Sub-Array 2:

93 93 93 93

-----------------------

-----------------------

Pivot Element=91

Sub-Array 1:

91

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=93

Sub-Array 1:

93 93 93

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=93

Sub-Array 1:

93 93

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=93

Sub-Array 1:

93

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=94

Sub-Array 1:

94 94 94

Sub-Array 2:

95

-----------------------

-----------------------

Pivot Element=94

Sub-Array 1:

94 94

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=94

Sub-Array 1:

94

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=97

Sub-Array 1:

97 96 96

Sub-Array 2:

98 98 98 98

-----------------------

-----------------------

Pivot Element=96

Sub-Array 1:

96

Sub-Array 2:

97

-----------------------

-----------------------

Pivot Element=98

Sub-Array 1:

98 98 98

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=98

Sub-Array 1:

98 98

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=98

Sub-Array 1:

98

Sub-Array 2:

-----------------------

Final sorted array:-

3 6 7 14 14 16 22 27 33 35 36 40 40 43 44 45 45 45 46 47 47 48 48 49 50 52 55 55 56 56 56 58 61 64 64 65 65 66 66 67 68 68 70 70 71 71 73 74 75 76 77 78 78 78 79 79 79 80 80 80 81 81 81 82 83 83 84 84 84 85 87 88 89 89 89 90 90 90 91 91 92 93 93 93 93 93 94 94 94 94 95 95 96 96 97 97 98 98 98 98

---------------------------------------

The Array of Pivots and leaf nodes:-

76 61 40 14 6 3 14 7 33 16 22 27 40 36 35 47 45 45 45 44 43 46 47 55 48 48 55 50 49 52 56 56 56 58 68 65 65 64 64 66 66 68 67 74 70 70 73 71 71 75 88 80 78 77 78 78 79 79 79 80 80 81 81 81 84 83 82 83 84 84 87 85 95 93 90 89 89 89 90 90 92 91 91 93 93 93 93 94 94 94 94 95 97 96 96 97 98 98 98 98

---------------------------------------

Converting the above array into B.S.T with Inorder Traversal as:-

3 6 7 14 14 16 22 27 33 35 36 40 40 43 44 45 45 45 46 47 47 48 48 49 50 52 55 55 56 56 56 58 61 64 64 65 65 66 66 67 68 68 70 70 71 71 73 74 75 76 77 78 78 78 79 79 79 80 80 80 81 81 81 82 83 83 84 84 84 85 87 88 89 89 89 90 90 90 91 91 92 93 93 93 93 93 94 94 94 94 95 95 96 96 97 97 98 98 98 98

The inorder traversal gives the result same as that of the sorted array by quick sort

Number of iteration := 67

BUILD SUCCESSFUL (total time: 0 seconds)

run:

100 contacts are:

9800000001 :-Equivalent 2 digit hashed value =39

9800000002 :-Equivalent 2 digit hashed value =54

.

.

.

.

9800000099 :-Equivalent 2 digit hashed value =66

9800000100 :-Equivalent 2 digit hashed value =95

---------------------------------------

-----------------------

Pivot Element=60

Sub-Array 1:

39 54 39 52 17 56 52 26 36 60 34 55 55 59 43 12 37 32 60 36 54 54 41 28 4 48 16 14 40 60 29 43 57

Sub-Array 2:

82 92 76 78 98 85 92 89 88 94 78 93 88 95 64 89 71 79 62 92 83 72 82 90 91 93 87 74 62 86 90 98 99 88 83 64 73 61 78 77 73 88 82 93 62 80 65 71 90 65 97 99 68 82 87 89 75 84 64 87 96 81 87 66 66 95

-----------------------

-----------------------

Pivot Element=43

Sub-Array 1:

39 39 17 26 36 34 43 12 37 32 36 41 28 4 16 14 40 29

Sub-Array 2:

54 52 56 52 60 55 55 59 60 54 54 48 60 57

-----------------------

-----------------------

Pivot Element=17

Sub-Array 1:

12 4 16 14

Sub-Array 2:

39 39 26 36 34 43 37 32 36 41 28 40 29

-----------------------

-----------------------

Pivot Element=12

Sub-Array 1:

4

Sub-Array 2:

16 14

-----------------------

-----------------------

Pivot Element=16

Sub-Array 1:

14

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=39

Sub-Array 1:

39 26 36 34 37 32 36 28 29

Sub-Array 2:

43 41 40

-----------------------

-----------------------

Pivot Element=34

Sub-Array 1:

26 32 28 29

Sub-Array 2:

39 36 37 36

-----------------------

-----------------------

Pivot Element=32

Sub-Array 1:

26 28 29

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=26

Sub-Array 1:

Sub-Array 2:

28 29

-----------------------

-----------------------

Pivot Element=28

Sub-Array 1:

Sub-Array 2:

29

-----------------------

-----------------------

Pivot Element=36

Sub-Array 1:

36

Sub-Array 2:

39 37

-----------------------

-----------------------

Pivot Element=39

Sub-Array 1:

37

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=41

Sub-Array 1:

40

Sub-Array 2:

43

-----------------------

-----------------------

Pivot Element=55

Sub-Array 1:

54 52 52 55 54 54 48

Sub-Array 2:

56 60 59 60 60 57

-----------------------

-----------------------

Pivot Element=52

Sub-Array 1:

52 48

Sub-Array 2:

54 55 54 54

-----------------------

-----------------------

Pivot Element=52

Sub-Array 1:

48

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=54

Sub-Array 1:

54 54

Sub-Array 2:

55

-----------------------

-----------------------

Pivot Element=54

Sub-Array 1:

54

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=59

Sub-Array 1:

56 57

Sub-Array 2:

60 60 60

-----------------------

-----------------------

Pivot Element=56

Sub-Array 1:

Sub-Array 2:

57

-----------------------

-----------------------

Pivot Element=60

Sub-Array 1:

60 60

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=60

Sub-Array 1:

60

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=88

Sub-Array 1:

82 76 78 85 88 78 64 71 79 62 83 72 82 87 74 62 86 88 83 64 73 61 78 77 73 88 82 62 80 65 71 65 68 82 87 75 84 64 87 81 87 66 66

Sub-Array 2:

92 98 92 89 94 93 95 89 92 90 91 93 90 98 99 93 90 97 99 89 96 95

-----------------------

-----------------------

Pivot Element=82

Sub-Array 1:

82 76 78 78 64 71 79 62 72 82 74 62 64 73 61 78 77 73 82 62 80 65 71 65 68 75 64 81 66 66

Sub-Array 2:

85 88 83 87 86 88 83 88 87 84 87 87

-----------------------

-----------------------

Pivot Element=77

Sub-Array 1:

76 64 71 62 72 74 62 64 73 61 73 62 65 71 65 68 75 64 66 66

Sub-Array 2:

82 78 78 79 82 78 82 80 81

-----------------------

-----------------------

Pivot Element=64

Sub-Array 1:

64 62 62 61 62 64

Sub-Array 2:

76 71 72 74 73 73 65 71 65 68 75 66 66

-----------------------

-----------------------

Pivot Element=62

Sub-Array 1:

62 61 62

Sub-Array 2:

64 64

-----------------------

-----------------------

Pivot Element=62

Sub-Array 1:

61 62

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=61

Sub-Array 1:

Sub-Array 2:

62

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Pivot Element=64

Sub-Array 1:

64

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=72

Sub-Array 1:

71 65 71 65 68 66 66

Sub-Array 2:

76 74 73 73 75

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Pivot Element=68

Sub-Array 1:

65 65 66 66

Sub-Array 2:

71 71

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-----------------------

Pivot Element=65

Sub-Array 1:

65

Sub-Array 2:

66 66

-----------------------

-----------------------

Pivot Element=66

Sub-Array 1:

66

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=71

Sub-Array 1:

71

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=73

Sub-Array 1:

73

Sub-Array 2:

76 74 75

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-----------------------

Pivot Element=74

Sub-Array 1:

Sub-Array 2:

76 75

-----------------------

-----------------------

Pivot Element=76

Sub-Array 1:

75

Sub-Array 2:

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-----------------------

Pivot Element=80

Sub-Array 1:

78 78 79 78

Sub-Array 2:

82 82 82 81

-----------------------

-----------------------

Pivot Element=79

Sub-Array 1:

78 78 78

Sub-Array 2:

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Pivot Element=78

Sub-Array 1:

78 78

Sub-Array 2:

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Pivot Element=78

Sub-Array 1:

78

Sub-Array 2:

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-----------------------

Pivot Element=82

Sub-Array 1:

82 82 81

Sub-Array 2:

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-----------------------

Pivot Element=82

Sub-Array 1:

82 81

Sub-Array 2:

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-----------------------

Pivot Element=82

Sub-Array 1:

81

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=87

Sub-Array 1:

85 83 87 86 83 84 87 87

Sub-Array 2:

88 88 88

-----------------------

-----------------------

Pivot Element=84

Sub-Array 1:

83 83

Sub-Array 2:

85 87 86 87 87

-----------------------

-----------------------

Pivot Element=83

Sub-Array 1:

83

Sub-Array 2:

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Pivot Element=86

Sub-Array 1:

85

Sub-Array 2:

87 87 87

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-----------------------

Pivot Element=87

Sub-Array 1:

87 87

Sub-Array 2:

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Pivot Element=87

Sub-Array 1:

87

Sub-Array 2:

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Pivot Element=88

Sub-Array 1:

88 88

Sub-Array 2:

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Pivot Element=88

Sub-Array 1:

88

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=92

Sub-Array 1:

92 89 89 92 90 91 90 90 89

Sub-Array 2:

98 94 93 95 93 98 99 93 97 99 96 95

-----------------------

-----------------------

Pivot Element=90

Sub-Array 1:

89 89 90 90 89

Sub-Array 2:

92 92 91

-----------------------

-----------------------

Pivot Element=89

Sub-Array 1:

89 89

Sub-Array 2:

90 90

-----------------------

-----------------------

Pivot Element=89

Sub-Array 1:

89

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=90

Sub-Array 1:

90

Sub-Array 2:

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-----------------------

Pivot Element=92

Sub-Array 1:

92 91

Sub-Array 2:

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Pivot Element=92

Sub-Array 1:

91

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=93

Sub-Array 1:

93 93

Sub-Array 2:

98 94 95 98 99 97 99 96 95

-----------------------

-----------------------

Pivot Element=93

Sub-Array 1:

93

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=96

Sub-Array 1:

94 95 95

Sub-Array 2:

98 98 99 97 99

-----------------------

-----------------------

Pivot Element=95

Sub-Array 1:

94 95

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=94

Sub-Array 1:

Sub-Array 2:

95

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-----------------------

Pivot Element=98

Sub-Array 1:

98 97

Sub-Array 2:

99 99

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Pivot Element=98

Sub-Array 1:

97

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=99

Sub-Array 1:

99

Sub-Array 2:

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Final sorted array:-

4 12 14 16 17 26 28 29 32 34 36 36 37 39 39 40 41 43 43 48 52 52 54 54 54 55 55 56 57 59 60 60 60 60 61 62 62 62 64 64 64 65 65 66 66 68 71 71 72 73 73 74 75 76 77 78 78 78 79 80 81 82 82 82 82 83 83 84 85 86 87 87 87 87 88 88 88 88 89 89 89 90 90 90 91 92 92 92 93 93 93 94 95 95 96 97 98 98 99 99

---------------------------------------

The Array of Pivots and leaf nodes:-

60 43 17 12 4 16 14 39 34 32 26 28 29 36 36 39 37 41 40 43 55 52 52 48 54 54 54 55 59 56 57 60 60 60 88 82 77 64 62 62 61 62 64 64 72 68 65 65 66 66 71 71 73 73 74 76 75 80 79 78 78 78 82 82 82 81 87 84 83 83 86 85 87 87 87 88 88 88 92 90 89 89 89 90 90 92 92 91 93 93 93 96 95 94 95 98 98 97 99 99

---------------------------------------

Converting the above array into B.S.T with Inorder Traversal as:-

4 12 14 16 17 26 28 29 32 34 36 36 37 39 39 40 41 43 43 48 52 52 54 54 54 55 55 56 57 59 60 60 60 60 61 62 62 62 64 64 64 65 65 66 66 68 71 71 72 73 73 74 75 76 77 78 78 78 79 80 81 82 82 82 82 83 83 84 85 86 87 87 87 87 88 88 88 88 89 89 89 90 90 90 91 92 92 92 93 93 93 94 95 95 96 97 98 98 99 99

The inorder traversal gives the result same as that of the sorted array by quick sort

Number of iteration := 68

BUILD SUCCESSFUL (total time: 0 seconds)

run:

100 contacts are:

9800000001 :-Equivalent 2 digit hashed value =94

9800000002 :-Equivalent 2 digit hashed value =78

.

.

.

9800000099 :-Equivalent 2 digit hashed value =77

9800000100 :-Equivalent 2 digit hashed value =41

---------------------------------------

-----------------------

Pivot Element=72

Sub-Array 1:

50 66 50 43 63 23 45 51 40 51 44 13 65 51 20 28 39 52 60 65 38 55 41 51 50 69 27 42 46 71 15 70 23 69 51 64 52 49 44 28 47 27 44 56 68 44 44 7 61 60 34 22 49 50 47 41

Sub-Array 2:

94 78 74 87 99 89 87 84 82 74 95 80 80 74 75 88 91 94 77 81 87 95 88 95 81 96 89 77 91 77 90 95 94 92 91 84 80 85 96 99 80 90 77

-----------------------

-----------------------

Pivot Element=44

Sub-Array 1:

43 23 40 44 13 20 28 39 38 41 27 42 15 23 44 28 27 44 44 7 34 22 41

Sub-Array 2:

50 66 50 63 45 51 51 65 51 52 60 65 55 51 50 69 46 71 70 69 51 64 52 49 47 56 68 61 60 49 50 47

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-----------------------

Pivot Element=28

Sub-Array 1:

23 13 20 27 15 23 28 27 7 22

Sub-Array 2:

43 40 44 39 38 41 42 44 44 44 34 41

-----------------------

-----------------------

Pivot Element=20

Sub-Array 1:

13 15 7

Sub-Array 2:

23 27 23 28 27 22

-----------------------

-----------------------

Pivot Element=13

Sub-Array 1:

7

Sub-Array 2:

15

-----------------------

-----------------------

Pivot Element=23

Sub-Array 1:

23 22

Sub-Array 2:

27 28 27

-----------------------

-----------------------

Pivot Element=23

Sub-Array 1:

22

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=28

Sub-Array 1:

27 27

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=27

Sub-Array 1:

27

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=40

Sub-Array 1:

39 38 34

Sub-Array 2:

43 44 41 42 44 44 44 41

-----------------------

-----------------------

Pivot Element=38

Sub-Array 1:

34

Sub-Array 2:

39

-----------------------

-----------------------

Pivot Element=41

Sub-Array 1:

41

Sub-Array 2:

43 44 42 44 44 44

-----------------------

-----------------------

Pivot Element=43

Sub-Array 1:

42

Sub-Array 2:

44 44 44 44

-----------------------

-----------------------

Pivot Element=44

Sub-Array 1:

44 44 44

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=44

Sub-Array 1:

44 44

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=44

Sub-Array 1:

44

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=52

Sub-Array 1:

50 50 45 51 51 51 52 51 50 46 51 49 47 49 50 47

Sub-Array 2:

66 63 65 60 65 55 69 71 70 69 64 56 68 61 60

-----------------------

-----------------------

Pivot Element=50

Sub-Array 1:

50 50 45 50 46 49 47 49 47

Sub-Array 2:

51 51 51 52 51 51

-----------------------

-----------------------

Pivot Element=49

Sub-Array 1:

45 46 47 49 47

Sub-Array 2:

50 50 50

-----------------------

-----------------------

Pivot Element=47

Sub-Array 1:

45 46 47

Sub-Array 2:

49

-----------------------

-----------------------

Pivot Element=46

Sub-Array 1:

45

Sub-Array 2:

47

-----------------------

-----------------------

Pivot Element=50

Sub-Array 1:

50 50

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=50

Sub-Array 1:

50

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=51

Sub-Array 1:

51 51 51 51

Sub-Array 2:

52

-----------------------

-----------------------

Pivot Element=51

Sub-Array 1:

51 51 51

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=51

Sub-Array 1:

51 51

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=51

Sub-Array 1:

51

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=68

Sub-Array 1:

66 63 65 60 65 55 64 56 61 60

Sub-Array 2:

69 71 70 69

-----------------------

-----------------------

Pivot Element=61

Sub-Array 1:

60 55 56 60

Sub-Array 2:

66 63 65 65 64

-----------------------

-----------------------

Pivot Element=55

Sub-Array 1:

Sub-Array 2:

60 56 60

-----------------------

-----------------------

Pivot Element=60

Sub-Array 1:

56 60

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=56

Sub-Array 1:

Sub-Array 2:

60

-----------------------

-----------------------

Pivot Element=65

Sub-Array 1:

63 65 64

Sub-Array 2:

66

-----------------------

-----------------------

Pivot Element=65

Sub-Array 1:

63 64

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=63

Sub-Array 1:

Sub-Array 2:

64

-----------------------

-----------------------

Pivot Element=71

Sub-Array 1:

69 70 69

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=69

Sub-Array 1:

69

Sub-Array 2:

70

-----------------------

-----------------------

Pivot Element=91

Sub-Array 1:

78 74 87 89 87 84 82 74 80 80 74 75 88 91 77 81 87 88 81 89 77 77 90 91 84 80 85 80 90 77

Sub-Array 2:

94 99 95 94 95 95 96 95 94 92 96 99

-----------------------

-----------------------

Pivot Element=81

Sub-Array 1:

78 74 74 80 80 74 75 77 81 77 77 80 80 77

Sub-Array 2:

87 89 87 84 82 88 91 87 88 89 90 91 84 85 90

-----------------------

-----------------------

Pivot Element=77

Sub-Array 1:

74 74 74 75 77 77 77

Sub-Array 2:

78 80 80 81 80 80

-----------------------

-----------------------

Pivot Element=74

Sub-Array 1:

74 74

Sub-Array 2:

75 77 77 77

-----------------------

-----------------------

Pivot Element=74

Sub-Array 1:

74

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=77

Sub-Array 1:

75 77 77

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=77

Sub-Array 1:

75 77

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=75

Sub-Array 1:

Sub-Array 2:

77

-----------------------

-----------------------

Pivot Element=80

Sub-Array 1:

78 80 80 80

Sub-Array 2:

81

-----------------------

-----------------------

Pivot Element=80

Sub-Array 1:

78 80 80

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=78

Sub-Array 1:

Sub-Array 2:

80 80

-----------------------

-----------------------

Pivot Element=80

Sub-Array 1:

80

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=89

Sub-Array 1:

87 87 84 82 88 87 88 89 84 85

Sub-Array 2:

91 90 91 90

-----------------------

-----------------------

Pivot Element=87

Sub-Array 1:

87 84 82 87 84 85

Sub-Array 2:

88 88 89

-----------------------

-----------------------

Pivot Element=84

Sub-Array 1:

82 84

Sub-Array 2:

87 87 85

-----------------------

-----------------------

Pivot Element=82

Sub-Array 1:

Sub-Array 2:

84

-----------------------

-----------------------

Pivot Element=87

Sub-Array 1:

87 85

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=87

Sub-Array 1:

85

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=88

Sub-Array 1:

88

Sub-Array 2:

89

-----------------------

-----------------------

Pivot Element=91

Sub-Array 1:

90 91 90

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=90

Sub-Array 1:

90

Sub-Array 2:

91

-----------------------

-----------------------

Pivot Element=95

Sub-Array 1:

94 95 94 95 95 94 92

Sub-Array 2:

99 96 96 99

-----------------------

-----------------------

Pivot Element=94

Sub-Array 1:

94 94 92

Sub-Array 2:

95 95 95

-----------------------

-----------------------

Pivot Element=94

Sub-Array 1:

94 92

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=94

Sub-Array 1:

92

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=95

Sub-Array 1:

95 95

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=95

Sub-Array 1:

95

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=96

Sub-Array 1:

96

Sub-Array 2:

99 99

-----------------------

-----------------------

Pivot Element=99

Sub-Array 1:

99

Sub-Array 2:

-----------------------

Final sorted array:-

7 13 15 20 22 23 23 27 27 28 28 34 38 39 40 41 41 42 43 44 44 44 44 44 45 46 47 47 49 49 50 50 50 50 51 51 51 51 51 52 52 55 56 60 60 61 63 64 65 65 66 68 69 69 70 71 72 74 74 74 75 77 77 77 77 78 80 80 80 80 81 81 82 84 84 85 87 87 87 88 88 89 89 90 90 91 91 91 92 94 94 94 95 95 95 95 96 96 99 99

---------------------------------------

The Array of Pivots and leaf nodes:-

72 44 28 20 13 7 15 23 23 22 28 27 27 40 38 34 39 41 41 43 42 44 44 44 44 52 50 49 47 46 45 47 49 50 50 50 51 51 51 51 51 52 68 61 55 60 56 60 65 65 63 64 66 71 69 69 70 91 81 77 74 74 74 77 77 75 77 80 80 78 80 80 81 89 87 84 82 84 87 87 85 88 88 89 91 90 90 91 95 94 94 94 92 95 95 95 96 96 99 99

---------------------------------------

Converting the above array into B.S.T with Inorder Traversal as:-

7 13 15 20 22 23 23 27 27 28 28 34 38 39 40 41 41 42 43 44 44 44 44 44 45 46 47 47 49 49 50 50 50 50 51 51 51 51 51 52 52 55 56 60 60 61 63 64 65 65 66 68 69 69 70 71 72 74 74 74 75 77 77 77 77 78 80 80 80 80 81 81 82 84 84 85 87 87 87 88 88 89 89 90 90 91 91 91 92 94 94 94 95 95 95 95 96 96 99 99

The inorder traversal gives the result same as that of the sorted array by quick sort

Number of iteration := 66

BUILD SUCCESSFUL (total time: 0 seconds)

run:

100 contacts are:

9800000001 :-Equivalent 2 digit hashed value =74

9800000002 :-Equivalent 2 digit hashed value =89

.

.

.

.

9800000098 :-Equivalent 2 digit hashed value =41

9800000099 :-Equivalent 2 digit hashed value =92

9800000100 :-Equivalent 2 digit hashed value =58

---------------------------------------

-----------------------

Pivot Element=54

Sub-Array 1:

43 9 53 29 23 20 34 31 29 43 51 50 41 41 42 34 46 39 35 48 43 48 34 35 52 19 34 39 41 29 41

Sub-Array 2:

74 89 77 84 70 63 68 87 73 96 99 68 78 65 56 78 58 55 91 83 91 93 92 81 82 88 71 95 85 78 90 63 87 59 91 90 57 85 94 56 80 78 95 83 69 93 73 69 72 93 62 88 69 92 64 79 82 59 63 64 81 60 97 91 93 80 92 58

-----------------------

-----------------------

Pivot Element=42

Sub-Array 1:

9 29 23 20 34 31 29 41 41 34 39 35 34 35 19 34 39 41 29 41

Sub-Array 2:

43 53 43 51 50 46 48 43 48 52

-----------------------

-----------------------

Pivot Element=29

Sub-Array 1:

9 23 20 29 19 29

Sub-Array 2:

34 31 41 41 34 39 35 34 35 34 39 41 41

-----------------------

-----------------------

Pivot Element=23

Sub-Array 1:

9 20 19

Sub-Array 2:

29 29

-----------------------

-----------------------

Pivot Element=20

Sub-Array 1:

9 19

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=9

Sub-Array 1:

Sub-Array 2:

19

-----------------------

-----------------------

Pivot Element=29

Sub-Array 1:

29

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=35

Sub-Array 1:

34 31 34 34 35 34

Sub-Array 2:

41 41 39 39 41 41

-----------------------

-----------------------

Pivot Element=34

Sub-Array 1:

31 34 34 34

Sub-Array 2:

35

-----------------------

-----------------------

Pivot Element=34

Sub-Array 1:

31 34 34

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=34

Sub-Array 1:

31 34

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=31

Sub-Array 1:

Sub-Array 2:

34

-----------------------

-----------------------

Pivot Element=39

Sub-Array 1:

39

Sub-Array 2:

41 41 41 41

-----------------------

-----------------------

Pivot Element=41

Sub-Array 1:

41 41 41

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=41

Sub-Array 1:

41 41

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=41

Sub-Array 1:

41

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=48

Sub-Array 1:

43 43 46 43 48

Sub-Array 2:

53 51 50 52

-----------------------

-----------------------

Pivot Element=43

Sub-Array 1:

43 43

Sub-Array 2:

46 48

-----------------------

-----------------------

Pivot Element=43

Sub-Array 1:

43

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=46

Sub-Array 1:

Sub-Array 2:

48

-----------------------

-----------------------

Pivot Element=53

Sub-Array 1:

51 50 52

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=51

Sub-Array 1:

50

Sub-Array 2:

52

-----------------------

-----------------------

Pivot Element=72

Sub-Array 1:

70 63 68 68 65 56 58 55 71 63 59 57 56 69 69 62 69 64 59 63 64 60 58

Sub-Array 2:

74 89 77 84 87 73 96 99 78 78 91 83 91 93 92 81 82 88 95 85 78 90 87 91 90 85 94 80 78 95 83 93 73 93 88 92 79 82 81 97 91 93 80 92

-----------------------

-----------------------

Pivot Element=59

Sub-Array 1:

56 58 55 59 57 56 58

Sub-Array 2:

70 63 68 68 65 71 63 69 69 62 69 64 63 64 60

-----------------------

-----------------------

Pivot Element=56

Sub-Array 1:

55 56

Sub-Array 2:

58 59 57 58

-----------------------

-----------------------

Pivot Element=55

Sub-Array 1:

Sub-Array 2:

56

-----------------------

-----------------------

Pivot Element=57

Sub-Array 1:

Sub-Array 2:

58 59 58

-----------------------

-----------------------

Pivot Element=59

Sub-Array 1:

58 58

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=58

Sub-Array 1:

58

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=63

Sub-Array 1:

63 63 62 60

Sub-Array 2:

70 68 68 65 71 69 69 69 64 64

-----------------------

-----------------------

Pivot Element=62

Sub-Array 1:

60

Sub-Array 2:

63 63

-----------------------

-----------------------

Pivot Element=63

Sub-Array 1:

63

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=68

Sub-Array 1:

68 65 64 64

Sub-Array 2:

70 71 69 69 69

-----------------------

-----------------------

Pivot Element=65

Sub-Array 1:

64 64

Sub-Array 2:

68

-----------------------

-----------------------

Pivot Element=64

Sub-Array 1:

64

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=69

Sub-Array 1:

69 69

Sub-Array 2:

70 71

-----------------------

-----------------------

Pivot Element=69

Sub-Array 1:

69

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=70

Sub-Array 1:

Sub-Array 2:

71

-----------------------

-----------------------

Pivot Element=88

Sub-Array 1:

74 77 84 87 73 78 78 83 81 82 85 78 87 85 80 78 83 73 88 79 82 81 80

Sub-Array 2:

89 96 99 91 91 93 92 95 90 91 90 94 95 93 93 92 97 91 93 92

-----------------------

-----------------------

Pivot Element=82

Sub-Array 1:

74 77 73 78 78 81 78 80 78 73 79 82 81 80

Sub-Array 2:

84 87 83 85 87 85 83 88

-----------------------

-----------------------

Pivot Element=78

Sub-Array 1:

74 77 73 78 78 78 73

Sub-Array 2:

81 80 79 82 81 80

-----------------------

-----------------------

Pivot Element=77

Sub-Array 1:

74 73 73

Sub-Array 2:

78 78 78

-----------------------

-----------------------

Pivot Element=74

Sub-Array 1:

73 73

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=73

Sub-Array 1:

73

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=78

Sub-Array 1:

78 78

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=78

Sub-Array 1:

78

Sub-Array 2:

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-----------------------

Pivot Element=80

Sub-Array 1:

79 80

Sub-Array 2:

81 82 81

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-----------------------

Pivot Element=79

Sub-Array 1:

Sub-Array 2:

80

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-----------------------

Pivot Element=82

Sub-Array 1:

81 81

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=81

Sub-Array 1:

81

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=87

Sub-Array 1:

84 87 83 85 85 83

Sub-Array 2:

88

-----------------------

-----------------------

Pivot Element=83

Sub-Array 1:

83

Sub-Array 2:

84 87 85 85

-----------------------

-----------------------

Pivot Element=87

Sub-Array 1:

84 85 85

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=85

Sub-Array 1:

84 85

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=84

Sub-Array 1:

Sub-Array 2:

85

-----------------------

-----------------------

Pivot Element=92

Sub-Array 1:

89 91 91 92 90 91 90 91 92

Sub-Array 2:

96 99 93 95 94 95 93 93 97 93

-----------------------

-----------------------

Pivot Element=91

Sub-Array 1:

89 91 91 90 91 90

Sub-Array 2:

92 92

-----------------------

-----------------------

Pivot Element=90

Sub-Array 1:

89 90

Sub-Array 2:

91 91 91

-----------------------

-----------------------

Pivot Element=89

Sub-Array 1:

Sub-Array 2:

90

-----------------------

-----------------------

Pivot Element=91

Sub-Array 1:

91 91

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=91

Sub-Array 1:

91

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=92

Sub-Array 1:

92

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=95

Sub-Array 1:

93 95 94 93 93 93

Sub-Array 2:

96 99 97

-----------------------

-----------------------

Pivot Element=93

Sub-Array 1:

93 93 93

Sub-Array 2:

95 94

-----------------------

-----------------------

Pivot Element=93

Sub-Array 1:

93 93

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=93

Sub-Array 1:

93

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=95

Sub-Array 1:

94

Sub-Array 2:

-----------------------

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Pivot Element=99

Sub-Array 1:

96 97

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=96

Sub-Array 1:

Sub-Array 2:

97

-----------------------

Final sorted array:-

9 19 20 23 29 29 29 31 34 34 34 34 35 35 39 39 41 41 41 41 42 43 43 43 46 48 48 50 51 52 53 54 55 56 56 57 58 58 59 59 60 62 63 63 63 64 64 65 68 68 69 69 69 70 71 72 73 73 74 77 78 78 78 78 79 80 80 81 81 82 82 83 83 84 85 85 87 87 88 88 89 90 90 91 91 91 91 92 92 92 93 93 93 93 94 95 95 96 97 99

---------------------------------------

The Array of Pivots and leaf nodes:-

54 42 29 23 20 9 19 29 29 35 34 34 34 31 34 35 39 39 41 41 41 41 48 43 43 43 46 48 53 51 50 52 72 59 56 55 56 57 59 58 58 63 62 60 63 63 68 65 64 64 68 69 69 69 70 71 88 82 78 77 74 73 73 78 78 78 80 79 80 82 81 81 87 83 83 87 85 84 85 88 92 91 90 89 90 91 91 91 92 92 95 93 93 93 93 95 94 99 96 97

---------------------------------------

Converting the above array into B.S.T with Inorder Traversal as:-

9 19 20 23 29 29 29 31 34 34 34 34 35 35 39 39 41 41 41 41 42 43 43 43 46 48 48 50 51 52 53 54 55 56 56 57 58 58 59 59 60 62 63 63 63 64 64 65 68 68 69 69 69 70 71 72 73 73 74 77 78 78 78 78 79 80 80 81 81 82 82 83 83 84 85 85 87 87 88 88 89 90 90 91 91 91 91 92 92 92 93 93 93 93 94 95 95 96 97 99

The inorder traversal gives the result same as that of the sorted array by quick sort

Number of iteration := 69

BUILD SUCCESSFUL (total time: 0 seconds)

run:

100 contacts are:

9800000001 :-Equivalent 2 digit hashed value =95

9800000002 :-Equivalent 2 digit hashed value =62

.

.

.

.

9800000099 :-Equivalent 2 digit hashed value =50

9800000100 :-Equivalent 2 digit hashed value =67

---------------------------------------

-----------------------

Pivot Element=78

Sub-Array 1:

62 49 75 44 40 68 78 78 46 58 59 67 65 22 39 76 18 33 63 73 29 49 66 46 75 55 57 45 67 71 76 37 71 44 22 52 71 63 33 34 23 49 68 39 64 56 54 11 77 23 56 62 54 74 28 58 77 50 67

Sub-Array 2:

95 89 89 92 99 97 97 79 96 85 97 84 83 94 85 89 99 89 92 96 84 86 91 89 99 92 97 96 98 95 79 98 92 81 79 94 97 91 90 93

-----------------------

-----------------------

Pivot Element=62

Sub-Array 1:

62 49 44 40 46 58 59 22 39 18 33 29 49 46 55 57 45 37 44 22 52 33 34 23 49 39 56 54 11 23 56 54 28 58 50

Sub-Array 2:

75 68 78 78 67 65 76 63 73 66 75 67 71 76 71 71 63 68 64 77 74 77 67

-----------------------

-----------------------

Pivot Element=33

Sub-Array 1:

22 18 33 29 22 23 11 23 28

Sub-Array 2:

62 49 44 40 46 58 59 39 49 46 55 57 45 37 44 52 34 49 39 56 54 56 54 58 50

-----------------------

-----------------------

Pivot Element=22

Sub-Array 1:

18 22 11

Sub-Array 2:

33 29 23 23 28

-----------------------

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Pivot Element=22

Sub-Array 1:

18 11

Sub-Array 2:

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Pivot Element=18

Sub-Array 1:

11

Sub-Array 2:

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Pivot Element=23

Sub-Array 1:

23

Sub-Array 2:

33 29 28

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Pivot Element=33

Sub-Array 1:

29 28

Sub-Array 2:

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Pivot Element=29

Sub-Array 1:

28

Sub-Array 2:

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Pivot Element=54

Sub-Array 1:

49 44 40 46 39 49 46 45 37 44 52 34 49 39 54 50

Sub-Array 2:

62 58 59 55 57 56 56 58

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Pivot Element=44

Sub-Array 1:

40 39 37 44 34 39

Sub-Array 2:

49 46 49 46 45 52 49 54 50

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-----------------------

Pivot Element=39

Sub-Array 1:

37 34 39

Sub-Array 2:

40 44

-----------------------

-----------------------

Pivot Element=34

Sub-Array 1:

Sub-Array 2:

37 39

-----------------------

-----------------------

Pivot Element=37

Sub-Array 1:

Sub-Array 2:

39

-----------------------

-----------------------

Pivot Element=40

Sub-Array 1:

Sub-Array 2:

44

-----------------------

-----------------------

Pivot Element=46

Sub-Array 1:

46 45

Sub-Array 2:

49 49 52 49 54 50

-----------------------

-----------------------

Pivot Element=46

Sub-Array 1:

45

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=49

Sub-Array 1:

49 49

Sub-Array 2:

52 54 50

-----------------------

-----------------------

Pivot Element=49

Sub-Array 1:

49

Sub-Array 2:

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-----------------------

Pivot Element=54

Sub-Array 1:

52 50

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=52

Sub-Array 1:

50

Sub-Array 2:

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-----------------------

Pivot Element=56

Sub-Array 1:

55 56

Sub-Array 2:

62 58 59 57 58

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Pivot Element=55

Sub-Array 1:

Sub-Array 2:

56

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-----------------------

Pivot Element=59

Sub-Array 1:

58 57 58

Sub-Array 2:

62

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Pivot Element=58

Sub-Array 1:

57 58

Sub-Array 2:

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Pivot Element=57

Sub-Array 1:

Sub-Array 2:

58

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Pivot Element=68

Sub-Array 1:

68 67 65 63 66 67 63 64 67

Sub-Array 2:

75 78 78 76 73 75 71 76 71 71 77 74 77

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-----------------------

Pivot Element=64

Sub-Array 1:

63 63

Sub-Array 2:

68 67 65 66 67 67

-----------------------

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Pivot Element=63

Sub-Array 1:

63

Sub-Array 2:

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-----------------------

Pivot Element=67

Sub-Array 1:

65 66 67 67

Sub-Array 2:

68

-----------------------

-----------------------

Pivot Element=66

Sub-Array 1:

65

Sub-Array 2:

67 67

-----------------------

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Pivot Element=67

Sub-Array 1:

67

Sub-Array 2:

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-----------------------

Pivot Element=73

Sub-Array 1:

71 71 71

Sub-Array 2:

75 78 78 76 75 76 77 74 77

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Pivot Element=71

Sub-Array 1:

71 71

Sub-Array 2:

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Pivot Element=71

Sub-Array 1:

71

Sub-Array 2:

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Pivot Element=76

Sub-Array 1:

75 76 75 74

Sub-Array 2:

78 78 77 77

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-----------------------

Pivot Element=76

Sub-Array 1:

75 75 74

Sub-Array 2:

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Pivot Element=75

Sub-Array 1:

75 74

Sub-Array 2:

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Pivot Element=75

Sub-Array 1:

74

Sub-Array 2:

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Pivot Element=78

Sub-Array 1:

78 77 77

Sub-Array 2:

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Pivot Element=78

Sub-Array 1:

77 77

Sub-Array 2:

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Pivot Element=77

Sub-Array 1:

77

Sub-Array 2:

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-----------------------

Pivot Element=86

Sub-Array 1:

79 85 84 83 85 84 79 81 79

Sub-Array 2:

95 89 89 92 99 97 97 96 97 94 89 99 89 92 96 91 89 99 92 97 96 98 95 98 92 94 97 91 90 93

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Pivot Element=84

Sub-Array 1:

79 84 83 79 81 79

Sub-Array 2:

85 85

-----------------------

-----------------------

Pivot Element=79

Sub-Array 1:

79 79

Sub-Array 2:

84 83 81

-----------------------

-----------------------

Pivot Element=79

Sub-Array 1:

79

Sub-Array 2:

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Pivot Element=84

Sub-Array 1:

83 81

Sub-Array 2:

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Pivot Element=83

Sub-Array 1:

81

Sub-Array 2:

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Pivot Element=85

Sub-Array 1:

85

Sub-Array 2:

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Pivot Element=91

Sub-Array 1:

89 89 89 89 89 91 90

Sub-Array 2:

95 92 99 97 97 96 97 94 99 92 96 99 92 97 96 98 95 98 92 94 97 93

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-----------------------

Pivot Element=89

Sub-Array 1:

89 89 89 89

Sub-Array 2:

91 90

-----------------------

-----------------------

Pivot Element=89

Sub-Array 1:

89 89 89

Sub-Array 2:

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Pivot Element=89

Sub-Array 1:

89 89

Sub-Array 2:

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Pivot Element=89

Sub-Array 1:

89

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=91

Sub-Array 1:

90

Sub-Array 2:

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-----------------------

Pivot Element=96

Sub-Array 1:

95 92 96 94 92 92 96 95 92 94 93

Sub-Array 2:

99 97 97 97 99 99 97 98 98 97

-----------------------

-----------------------

Pivot Element=94

Sub-Array 1:

92 94 92 92 92 93

Sub-Array 2:

95 96 96 95

-----------------------

-----------------------

Pivot Element=92

Sub-Array 1:

92 92 92

Sub-Array 2:

94 93

-----------------------

-----------------------

Pivot Element=92

Sub-Array 1:

92 92

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=92

Sub-Array 1:

92

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=94

Sub-Array 1:

93

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=96

Sub-Array 1:

95 96 95

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=96

Sub-Array 1:

95 95

Sub-Array 2:

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-----------------------

Pivot Element=95

Sub-Array 1:

95

Sub-Array 2:

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-----------------------

Pivot Element=97

Sub-Array 1:

97 97 97 97

Sub-Array 2:

99 99 99 98 98

-----------------------

-----------------------

Pivot Element=97

Sub-Array 1:

97 97 97

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=97

Sub-Array 1:

97 97

Sub-Array 2:

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-----------------------

Pivot Element=97

Sub-Array 1:

97

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=98

Sub-Array 1:

98

Sub-Array 2:

99 99 99

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-----------------------

Pivot Element=99

Sub-Array 1:

99 99

Sub-Array 2:

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Pivot Element=99

Sub-Array 1:

99

Sub-Array 2:

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Final sorted array:-

11 18 22 22 23 23 28 29 33 33 34 37 39 39 40 44 44 45 46 46 49 49 49 50 52 54 54 55 56 56 57 58 58 59 62 62 63 63 64 65 66 67 67 67 68 68 71 71 71 73 74 75 75 76 76 77 77 78 78 78 79 79 79 81 83 84 84 85 85 86 89 89 89 89 89 90 91 91 92 92 92 92 93 94 94 95 95 96 96 96 97 97 97 97 97 98 98 99 99 99

---------------------------------------

The Array of Pivots and leaf nodes:-

78 62 33 22 22 18 11 23 23 33 29 28 54 44 39 34 37 39 40 44 46 46 45 49 49 49 54 52 50 56 55 56 59 58 57 58 62 68 64 63 63 67 66 65 67 67 68 73 71 71 71 76 76 75 75 74 78 78 77 77 86 84 79 79 79 84 83 81 85 85 91 89 89 89 89 89 91 90 96 94 92 92 92 92 94 93 96 96 95 95 97 97 97 97 97 98 98 99 99 99

---------------------------------------

Converting the above array into B.S.T with Inorder Traversal as:-

11 18 22 22 23 23 28 29 33 33 34 37 39 39 40 44 44 45 46 46 49 49 49 50 52 54 54 55 56 56 57 58 58 59 62 62 63 63 64 65 66 67 67 67 68 68 71 71 71 73 74 75 75 76 76 77 77 78 78 78 79 79 79 81 83 84 84 85 85 86 89 89 89 89 89 90 91 91 92 92 92 92 93 94 94 95 95 96 96 96 97 97 97 97 97 98 98 99 99 99

The inorder traversal gives the result same as that of the sorted array by quick sort

Number of iteration := 71

BUILD SUCCESSFUL (total time: 0 seconds)

run:

100 contacts are:

9800000001 :-Equivalent 2 digit hashed value =85

9800000002 :-Equivalent 2 digit hashed value =22

.

.

.

.

9800000099 :-Equivalent 2 digit hashed value =54

9800000100 :-Equivalent 2 digit hashed value =76

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Pivot Element=57

Sub-Array 1:

22 30 55 24 22 44 31 51 38 37 54 4 14 50 15 53 56 37 46 32 37 30 38 41 35 7 49 12 53 48 46 57 50 42 33 30 55 57 54

Sub-Array 2:

85 68 72 98 60 95 88 58 70 69 74 92 81 58 92 60 96 91 94 66 82 74 86 98 85 87 87 90 69 96 79 87 94 77 75 77 61 81 99 99 96 81 93 77 62 95 64 70 78 92 60 95 76 73 96 91 93 60 89 76

-----------------------

-----------------------

Pivot Element=35

Sub-Array 1:

22 30 24 22 31 4 14 15 32 30 7 12 33 30

Sub-Array 2:

55 44 51 38 37 54 50 53 56 37 46 37 38 41 49 53 48 46 57 50 42 55 57 54

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-----------------------

Pivot Element=30

Sub-Array 1:

22 24 22 4 14 15 30 7 12 30

Sub-Array 2:

31 32 33

-----------------------

-----------------------

Pivot Element=12

Sub-Array 1:

4 7

Sub-Array 2:

22 24 22 14 15 30 30

-----------------------

-----------------------

Pivot Element=4

Sub-Array 1:

Sub-Array 2:

7

-----------------------

-----------------------

Pivot Element=22

Sub-Array 1:

22 14 15

Sub-Array 2:

24 30 30

-----------------------

-----------------------

Pivot Element=14

Sub-Array 1:

Sub-Array 2:

22 15

-----------------------

-----------------------

Pivot Element=22

Sub-Array 1:

15

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=30

Sub-Array 1:

24 30

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=24

Sub-Array 1:

Sub-Array 2:

30

-----------------------

-----------------------

Pivot Element=32

Sub-Array 1:

31

Sub-Array 2:

33

-----------------------

-----------------------

Pivot Element=50

Sub-Array 1:

44 38 37 50 37 46 37 38 41 49 48 46 42

Sub-Array 2:

55 51 54 53 56 53 57 55 57 54

-----------------------

-----------------------

Pivot Element=44

Sub-Array 1:

38 37 37 37 38 41 42

Sub-Array 2:

50 46 49 48 46

-----------------------

-----------------------

Pivot Element=37

Sub-Array 1:

37 37

Sub-Array 2:

38 38 41 42

-----------------------

-----------------------

Pivot Element=37

Sub-Array 1:

37

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=38

Sub-Array 1:

38

Sub-Array 2:

41 42

-----------------------

-----------------------

Pivot Element=41

Sub-Array 1:

Sub-Array 2:

42

-----------------------

-----------------------

Pivot Element=46

Sub-Array 1:

46

Sub-Array 2:

50 49 48

-----------------------

-----------------------

Pivot Element=50

Sub-Array 1:

49 48

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=49

Sub-Array 1:

48

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=55

Sub-Array 1:

51 54 53 53 55 54

Sub-Array 2:

56 57 57

-----------------------

-----------------------

Pivot Element=53

Sub-Array 1:

51 53

Sub-Array 2:

54 55 54

-----------------------

-----------------------

Pivot Element=51

Sub-Array 1:

Sub-Array 2:

53

-----------------------

-----------------------

Pivot Element=54

Sub-Array 1:

54

Sub-Array 2:

55

-----------------------

-----------------------

Pivot Element=57

Sub-Array 1:

56 57

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=56

Sub-Array 1:

Sub-Array 2:

57

-----------------------

-----------------------

Pivot Element=92

Sub-Array 1:

85 68 72 60 88 58 70 69 74 81 58 92 60 91 66 82 74 86 85 87 87 90 69 79 87 77 75 77 61 81 81 77 62 64 70 78 92 60 76 73 91 60 89 76

Sub-Array 2:

98 95 96 94 98 96 94 99 99 96 93 95 95 96 93

-----------------------

-----------------------

Pivot Element=85

Sub-Array 1:

85 68 72 60 58 70 69 74 81 58 60 66 82 74 69 79 77 75 77 61 81 81 77 62 64 70 78 60 76 73 60 76

Sub-Array 2:

88 92 91 86 87 87 90 87 92 91 89

-----------------------

-----------------------

Pivot Element=62

Sub-Array 1:

60 58 58 60 61 60 60

Sub-Array 2:

85 68 72 70 69 74 81 66 82 74 69 79 77 75 77 81 81 77 64 70 78 76 73 76

-----------------------

-----------------------

Pivot Element=60

Sub-Array 1:

58 58 60 60 60

Sub-Array 2:

61

-----------------------

-----------------------

Pivot Element=58

Sub-Array 1:

58

Sub-Array 2:

60 60 60

-----------------------

-----------------------

Pivot Element=60

Sub-Array 1:

60 60

Sub-Array 2:

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-----------------------

Pivot Element=60

Sub-Array 1:

60

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=73

Sub-Array 1:

68 72 70 69 66 69 64 70

Sub-Array 2:

85 74 81 82 74 79 77 75 77 81 81 77 78 76 76

-----------------------

-----------------------

Pivot Element=70

Sub-Array 1:

68 69 66 69 64 70

Sub-Array 2:

72

-----------------------

-----------------------

Pivot Element=68

Sub-Array 1:

66 64

Sub-Array 2:

69 69 70

-----------------------

-----------------------

Pivot Element=66

Sub-Array 1:

64

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=69

Sub-Array 1:

69

Sub-Array 2:

70

-----------------------

-----------------------

Pivot Element=77

Sub-Array 1:

74 74 75 77 77 76 76

Sub-Array 2:

85 81 82 79 81 81 78

-----------------------

-----------------------

Pivot Element=76

Sub-Array 1:

74 74 75 76

Sub-Array 2:

77 77

-----------------------

-----------------------

Pivot Element=74

Sub-Array 1:

74

Sub-Array 2:

75 76

-----------------------

-----------------------

Pivot Element=75

Sub-Array 1:

Sub-Array 2:

76

-----------------------

-----------------------

Pivot Element=77

Sub-Array 1:

77

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=81

Sub-Array 1:

81 79 81 78

Sub-Array 2:

85 82

-----------------------

-----------------------

Pivot Element=79

Sub-Array 1:

78

Sub-Array 2:

81 81

-----------------------

-----------------------

Pivot Element=81

Sub-Array 1:

81

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=85

Sub-Array 1:

82

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=91

Sub-Array 1:

88 86 87 87 90 87 91 89

Sub-Array 2:

92 92

-----------------------

-----------------------

Pivot Element=90

Sub-Array 1:

88 86 87 87 87 89

Sub-Array 2:

91

-----------------------

-----------------------

Pivot Element=88

Sub-Array 1:

86 87 87 87

Sub-Array 2:

89

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-----------------------

Pivot Element=86

Sub-Array 1:

Sub-Array 2:

87 87 87

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Pivot Element=87

Sub-Array 1:

87 87

Sub-Array 2:

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Pivot Element=87

Sub-Array 1:

87

Sub-Array 2:

-----------------------

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Pivot Element=92

Sub-Array 1:

92

Sub-Array 2:

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Pivot Element=95

Sub-Array 1:

94 94 93 95 95 93

Sub-Array 2:

98 96 98 96 99 99 96 96

-----------------------

-----------------------

Pivot Element=93

Sub-Array 1:

93

Sub-Array 2:

94 94 95 95

-----------------------

-----------------------

Pivot Element=95

Sub-Array 1:

94 94 95

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=94

Sub-Array 1:

94

Sub-Array 2:

95

-----------------------

-----------------------

Pivot Element=98

Sub-Array 1:

98 96 96 96 96

Sub-Array 2:

99 99

-----------------------

-----------------------

Pivot Element=96

Sub-Array 1:

96 96 96

Sub-Array 2:

98

-----------------------

-----------------------

Pivot Element=96

Sub-Array 1:

96 96

Sub-Array 2:

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Pivot Element=96

Sub-Array 1:

96

Sub-Array 2:

-----------------------

-----------------------

Pivot Element=99

Sub-Array 1:

99

Sub-Array 2:

-----------------------

Final sorted array:-

4 7 12 14 15 22 22 24 30 30 30 31 32 33 35 37 37 37 38 38 41 42 44 46 46 48 49 50 50 51 53 53 54 54 55 55 56 57 57 57 58 58 60 60 60 60 61 62 64 66 68 69 69 70 70 72 73 74 74 75 76 76 77 77 77 78 79 81 81 81 82 85 85 86 87 87 87 88 89 90 91 91 92 92 92 93 93 94 94 95 95 95 96 96 96 96 98 98 99 99

---------------------------------------

The Array of Pivots and leaf nodes:-

57 35 30 12 4 7 22 14 22 15 30 24 30 32 31 33 50 44 37 37 37 38 38 41 42 46 46 50 49 48 55 53 51 53 54 54 55 57 56 57 92 85 62 60 58 58 60 60 60 61 73 70 68 66 64 69 69 70 72 77 76 74 74 75 76 77 77 81 79 78 81 81 85 82 91 90 88 86 87 87 87 89 91 92 92 95 93 93 95 94 94 95 98 96 96 96 96 98 99 99

---------------------------------------

Converting the above array into B.S.T with Inorder Traversal as:-

4 7 12 14 15 22 22 24 30 30 30 31 32 33 35 37 37 37 38 38 41 42 44 46 46 48 49 50 50 51 53 53 54 54 55 55 56 57 57 57 58 58 60 60 60 60 61 62 64 66 68 69 69 70 70 72 73 74 74 75 76 76 77 77 77 78 79 81 81 81 82 85 85 86 87 87 87 88 89 90 91 91 92 92 92 93 93 94 94 95 95 95 96 96 96 96 98 98 99 99

The inorder traversal gives the result same as that of the sorted array by quick sort

Number of iteration := 63

BUILD SUCCESSFUL (total time: 0 seconds)

Number of times the randomized function of quick sort being called in 10 executions were 68,66,67,66,67,68,66,69,71,63 respectively:-

Min iteration:- 63

Max Iteration:- 71

Most Frequent Iterations:- 66