[CS302-Data Structures] Quiz 7

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Q1: What is the main reason of using Red-Black Trees instead of conventional Binary Search Trees

A1:

Tree height is smaller

Q2: What is the main benefit of using Red-Black Trees instead of 2-3 and 2-3-3 Trees?

A2:

memory

Q3: What color must the leaves be in a red-black tree?

A3:

black

Q4: In a red-black tree, if a node is red, what color are its children?

A4:

black

Q5: What is the maximum height of a Red-Black Tree with 14 nodes? (Hint: The black depth of each external node in this tree is 2.) Draw an example of a tree with 14 nodes that achieves this maximum height.

A5:

The maximum height is five. This can be answered using the hint. A tree with a black-height of 2 can have an actual height of 5, by alternating Black and Red nodes on the path to the deepest node in the tree.

```
                    40
                  /     \
               20        60
              /  \      /    \
           10   30  50      80
                         /  \   / \
                      45  55 70 90
                                 /  \
                               85  95
                                /
                               83
```