Quiz 3: Red-Black Trees

Due date: Midnight of SaturdayFeb 26, 2022

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**[Question 1]** Show an illustration of the red-black trees after successively inserting the keys 5, 6, 8, 9, 10, 11 into an initially empty red-black tree. (show the final illustration)

Diagram

Description automatically generated

**[Question 2]** Explain how finding and removing the node with minimum vruntime is done in constant time in Completely Fair Scheduling. How is that possible considering that finding the leftmost node in a Red-Black Tree has a time complexity of O(log n)?

Removing the node with minimum vruntime is done in constant time in Completely Fair Scheduling because in the Red Black tree for Completely Fair Scheduling we store the node of the minimum vruntime so when we want to find and remove the node finding it is a constant time call look up for the minimum vruntime node and the deletion is just removing the node and then if the node had a right child make sure that node is black and if not make sure its parent is black. (As far as you need to look because Red-

Black trees are natural self-balancing)