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BST and AVL Project

6. What is the runtime and space complexity of the method in the previous problem?

The runtime complexity of the method is $O(n)$. The space complexity of the previous problem is $O(n)$ which is the worst case scenario when it comes to AVL trees.

8. What is the runtime and space complexity of the findMax method?

The runtime complexity of findMax method is $\Theta(\log n)$ while the space complexity being $O(n)$.

9.

c) Using any document editor, create a table to record your findings for the above for the different height AVL and BST trees.

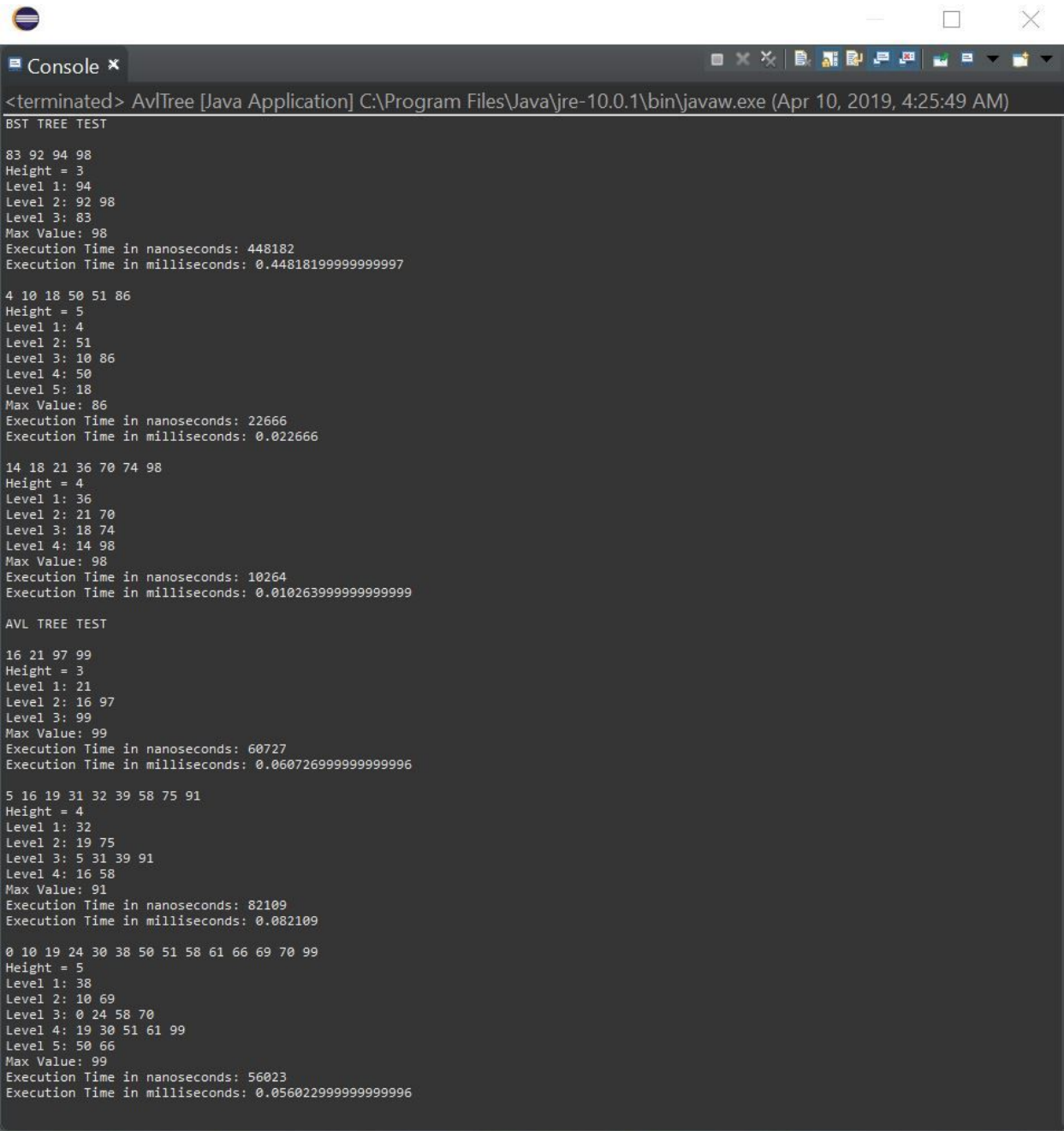
Execution Time in milliseconds

	BST	AVL
Height 3	0.448	0.0607
Height 4	0.0103	0.0821
Height 5	0.0227	0.0560

d) Write a short conclusion describing your findings.(30 words max)

We were able to visually and logically understand how binary nodes are created and used in different trees. For this code we created a BST and an AVL and we found that the AVL does take longer to run as compared to a BST with the same height.

Output from console:



```
<terminated> AvlTree [Java Application] C:\Program Files\Java\jre-10.0.1\bin\javaw.exe (Apr 10, 2019, 4:25:49 AM)
BST TREE TEST

83 92 94 98
Height = 3
Level 1: 94
Level 2: 92 98
Level 3: 83
Max Value: 98
Execution Time in nanoseconds: 448182
Execution Time in milliseconds: 0.44818199999999997

4 10 18 50 51 86
Height = 5
Level 1: 4
Level 2: 51
Level 3: 10 86
Level 4: 50
Level 5: 18
Max Value: 86
Execution Time in nanoseconds: 22666
Execution Time in milliseconds: 0.022666

14 18 21 36 70 74 98
Height = 4
Level 1: 36
Level 2: 21 70
Level 3: 18 74
Level 4: 14 98
Max Value: 98
Execution Time in nanoseconds: 10264
Execution Time in milliseconds: 0.010263999999999999

AVL TREE TEST

16 21 97 99
Height = 3
Level 1: 21
Level 2: 16 97
Level 3: 99
Max Value: 99
Execution Time in nanoseconds: 60727
Execution Time in milliseconds: 0.060726999999999996

5 16 19 31 32 39 58 75 91
Height = 4
Level 1: 32
Level 2: 19 75
Level 3: 5 31 39 91
Level 4: 16 58
Max Value: 91
Execution Time in nanoseconds: 82109
Execution Time in milliseconds: 0.082109

0 10 19 24 30 38 50 51 58 61 66 69 70 99
Height = 5
Level 1: 38
Level 2: 10 69
Level 3: 0 24 58 70
Level 4: 19 30 51 61 99
Level 5: 50 66
Max Value: 99
Execution Time in nanoseconds: 56023
Execution Time in milliseconds: 0.056022999999999996
```