

HW1: debug an AVL tree

軟工碩一 113525011 江大衛

題目要求

ANS:

bug1

- 原因：在輸入 8 的時候會發生錯誤
- 發生：不斷遞迴導致 stack overflow error.

[illegible]

PROF

修復

- bug1: `rotateWithLeftChild` 傳送的參數不正確

<pre> 84 if(height(t.right) - height(t.left) == 2) 85 if(x > t.right.data) 86 - t = rotateWithRightChild(t.right); 87 else 88 t = doubleWithRightChild(t); 89 } </pre>	<pre> 84 if(height(t.right) - height(t.left) == 2) 85 if(x > t.right.data) 86 + t = rotateWithRightChild(t); 87 else 88 t = doubleWithRightChild(t); 89 } </pre>
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- bug2: `rotateWithLeftChild`, `rotateWithRightChild` rotate 錯誤

- 解法

- 新增一個 AVLNode 做為回傳值。
- 將 function 傳近來的參數進行旋轉，並讓新增的 AVLNode 做為 root
- 在旋轉的過程中，如果有資料會被排擠到，則將它重新做一次 insert.

<pre> 95 /* Rotate binary tree node with left child */ 96 private AVLNode rotateWithLeftChild(AVLNode k2) 97 - { 98 AVLNode k1 = k2.left; 99 - k2.right = k1.left; 100 - k1.left = k2; 101 102 k2.height = max(height(k2.left), height(k2.right)) + 1; 103 k1.height = max(height(k1.left), k2.height) + 1; 104 105 return k1; 106 } 107 108 /* Rotate binary tree node with right child */ 109 private AVLNode rotateWithRightChild(AVLNode k1) 110 { 111 AVLNode k2 = k1.right; 112 - k1.left = k2.right; 113 - k2.right = k1; 114 k1.height = max(height(k1.left), height(k1.right)) + 1; 115 k2.height = max(height(k2.right), k1.height) + 1; 116 117 return k2; 118 } </pre>	<pre> 95 /* Rotate binary tree node with left child */ 96 private AVLNode rotateWithLeftChild(AVLNode k2) 97 + { 98 AVLNode k1 = k2.left; 99 + AVLNode k3 = k1.right; 100 + k2.left = null; 101 + k1.right = k2; 102 k2.height = max(height(k2.left), height(k2.right)) + 1; 103 k1.height = max(height(k1.left), k2.height) + 1; 104 + if(k3 != null) { 105 + insert(k3.data); 106 + } 107 return k1; 108 } 109 110 /* Rotate binary tree node with right child */ 111 private AVLNode rotateWithRightChild(AVLNode k1) 112 { 113 + AVLNode k2 = k1.right; 114 + AVLNode k3 = k2.left; 115 + k1.right = null; 116 + k2.left = k1; 117 + k1.height = max(height(k1.left), height(k1.right)) + 1; 118 + k2.height = max(height(k2.right), k1.height) + 1; 119 + if(k3 != null) { 120 + insert(k3.data); 121 + } 122 return k2; 123 } </pre>
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