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Base Case

$count\ NilT \leq 2^{(height\ NilT)} - 1$	
$0 \leq 2^0 - 1$	ctb, htb
$0 \leq 0$	

$Base\ case\ holds$

Assume

$$count\ (Node\ n\ x\ y) \leq 2^{(height\ (Node\ n\ x\ y))} - 1$$

Prove

$$count\ (Node\ n\ x\ y) \leq 2^{(height\ (Node\ n\ x\ y))} - 1$$

$$(count\ x) + (count\ y) + 1 \leq 2^{(\max\ (height\ x)\ (height\ y))+1} - 1 \qquad ctr, htr$$

The following step can be done because it is the maximum case.

$$2^{height\ x} - 1 + 2^{height\ y} - 1 + 1 \leq 2^{(\max\ (height\ x)\ (height\ y))+1} - 1 \qquad IA$$

$$2^{height\ x} + 2^{height\ y} \leq 2^{(\max\ (height\ x)\ (height\ y))+1}$$

Case mc1

$$2^{height\ x} + 2^{height\ x} \leq 2^{(height\ x)+1}$$

$$2^{(height\ x)+1} \leq 2^{(height\ x)+1}$$

Case mc2

$$2^{height\ y} + 2^{height\ y} \leq 2^{(height\ y)+1}$$

$$2^{(height\ y)+1} \leq 2^{(height\ y)+1}$$