

L 21 - 4/2 - btree pseudo code/AVL tree

Tuesday, April 2, 2019 4:32 PM

β -tree insert (T, k)

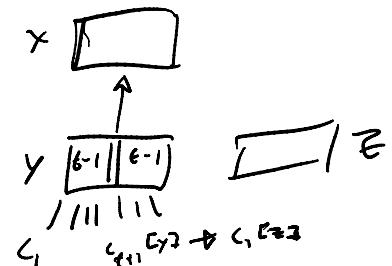
1. $r = \text{root}[T]$
 2. if $n[r] = 2^k - 1$
then $s = \text{allocate-node}();$
 3. $\text{root}[T] = s;$
 4. $\text{leaf}[s] = \text{false};$
 5. $n[s] = 0;$
 6. $c_1[s] = r;$ parent / ^{1st child}
7. | child
8. $\text{BtreeSplitChild}(s, 1, r);$
 |
 index of child
 9. $\text{BtreeInsertNonfull}(s, k) // \text{recursive}$

10. else

β tree Insert Non Full (T, k);

B tree Split Child (x , i , y) // $c_i[x] = y$

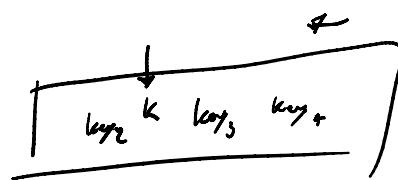
1. $z = \text{allocate-node}();$
 2. $\text{leaf}[z] = \text{leaf}[y];$
 3. $n[z] = \epsilon - 1;$
 4. for $j = 1 \text{ to } \epsilon - 1$
 5. do $\text{key}_j[z] = \text{key}_{j+\epsilon}[y]$
 6. if not $\text{leaf}[y]$
 7. then for $j = 1 \text{ to } \epsilon$
 8. do $c_j[z] = c_{j+\epsilon}[y];$



8. do $C_i[L^x] = C_{i+e-1}[y]$
9. $n[y] = e-1$;
10. for $i = n[x]+1$ down to $e+1$ // re-index child ptrs of parent
11. do $C_{i+1}[x] = C_i[x]$
12. $C_{e+1}[x] = Z$
13. for $j = n[x]$ down to Z // random keys
14. do $key_{j+1}[x] = K_j[x]$;
15. $key_e[x] = key_e[y]$;
16. $n[Z] = n[x]+1$
17. disk-write (x)
18. " " (y)
19. " " (Z)

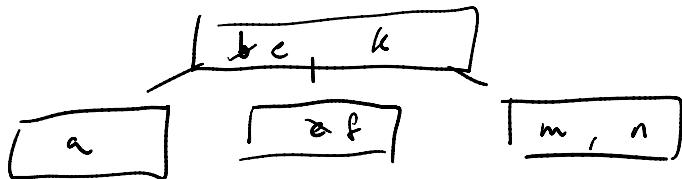
Btree Insert NonFull (x, k)

1. $i = n[x]$
2. if $leaf[x]$
then while $i \geq 1$ and $k < key_i[x]$
 3. do $key_{i+1}[x] = key_i[x]$
 4. $i--$;
 - 5.
 6. $key_{i+1}[x] = k$;
 7. $n[x]++$;
 8. Disk-write (x);
9. else
 10. while $i \geq 1$ and $k < key_i[x]$
 11. do $i--$;
 12. $i++$;
 13. Disk-read ($c_i[x]$);
 14. if $n[c_i[x]] = 2e-1$
 15. then BtreeSplitChild ($x, i, c_i[x]$);
 16. if $k > key_i[x]$
 17. then $i++$;

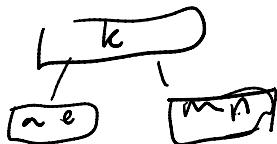


16. if $k > \text{key}(L^{\top})$
 17. then $i++$;
 18. $\text{BtreeInsertNonFull}(C_i[X], k)$;

Deletion



remove b



merge if you can't rotate

AVL tree:

1. Is a BST
2. For each node, the diff between the heights of its left and right subtrees is either 1, 0, -1
 - a. i.e. the balance factor of each node is either 1, 0, -1
 - b. Balance factor for each node = height(L) - height(R)

