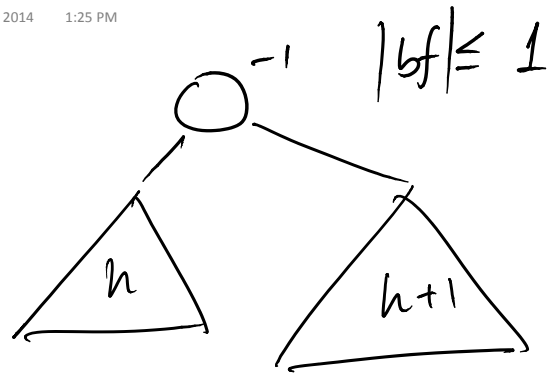
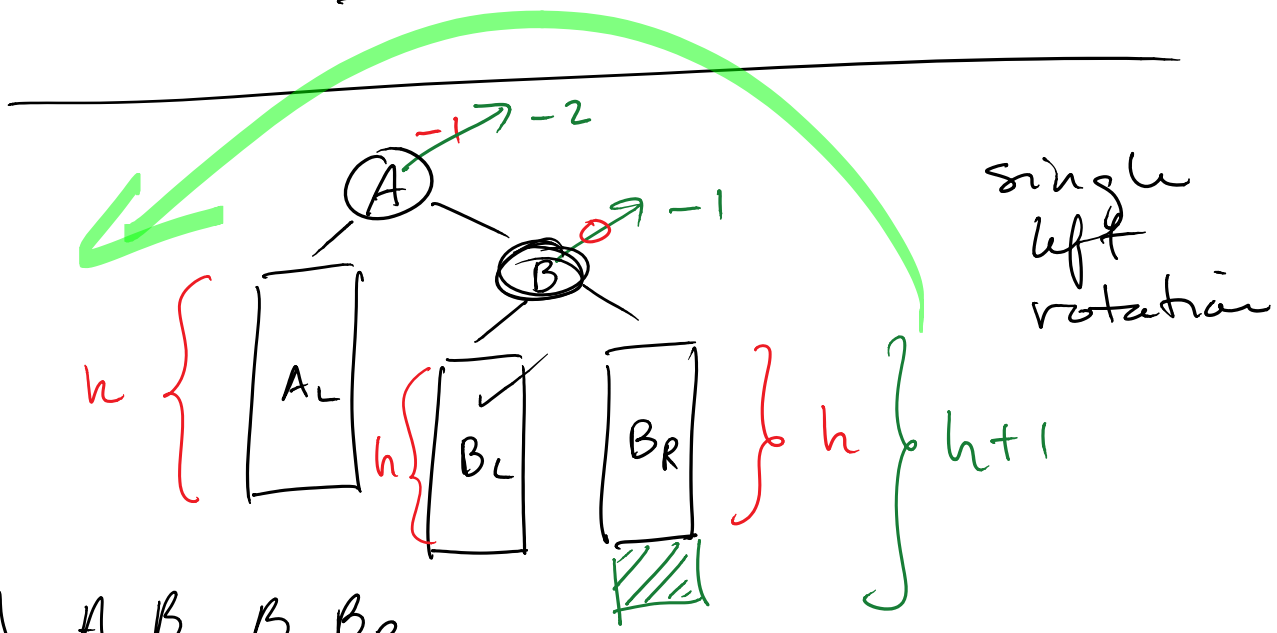
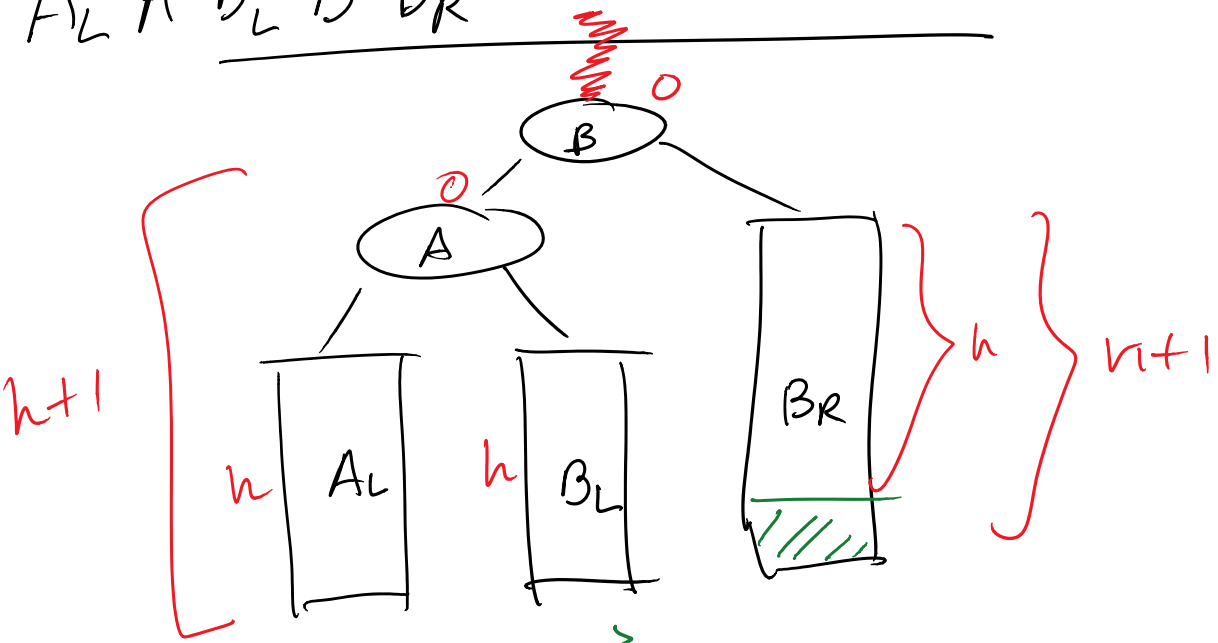
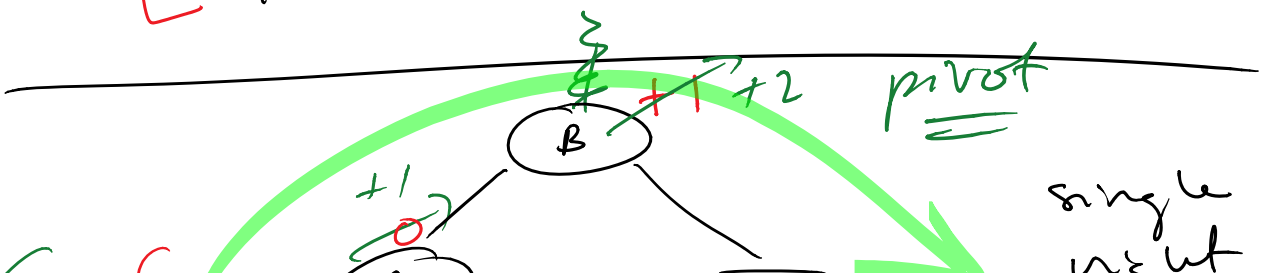
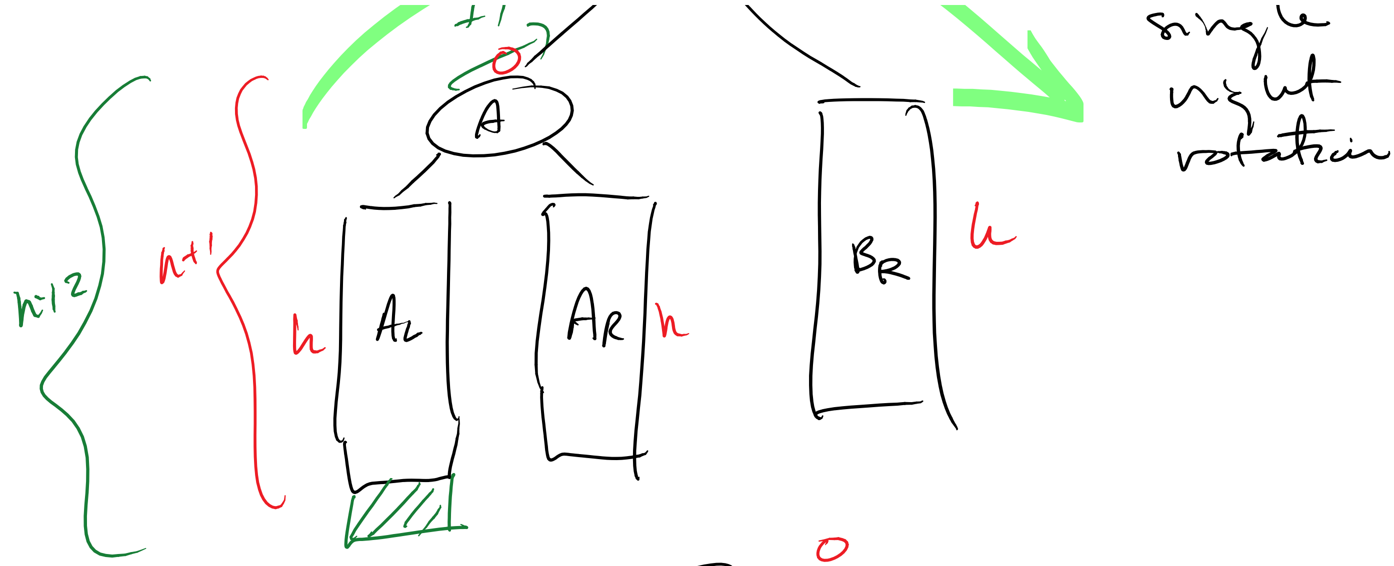

-1
|bf| ≤ 1
h
h+1

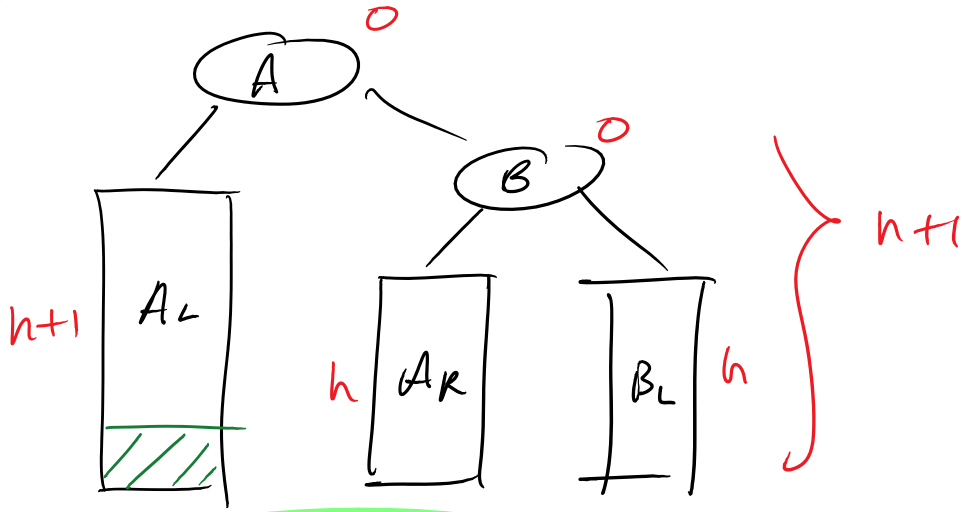

-1
-2
A
-1
B
h
A_L
h
B_L
B_R
h
h+1
single left rotation

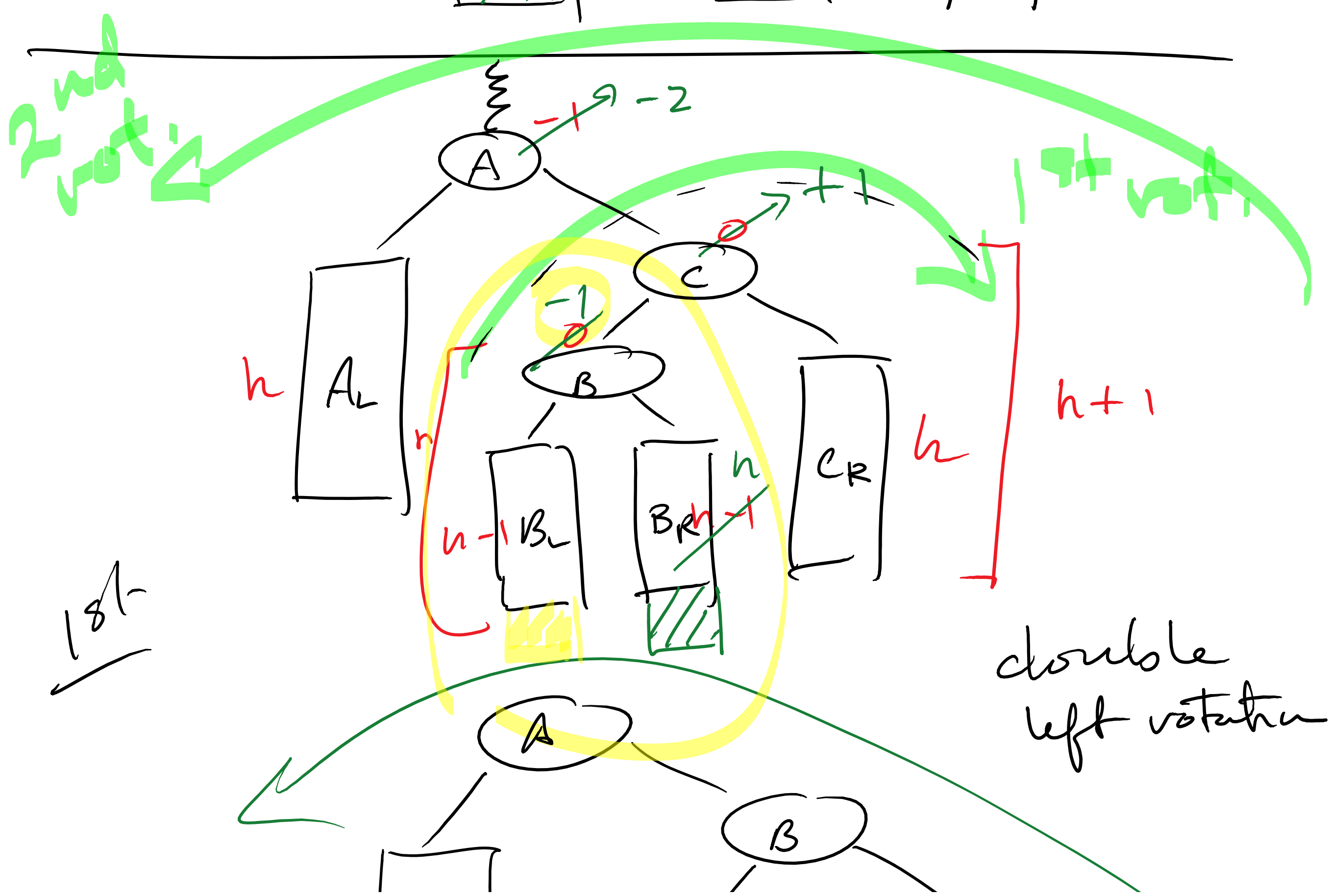
$A_L\ A\ B_L\ B\ B_R$

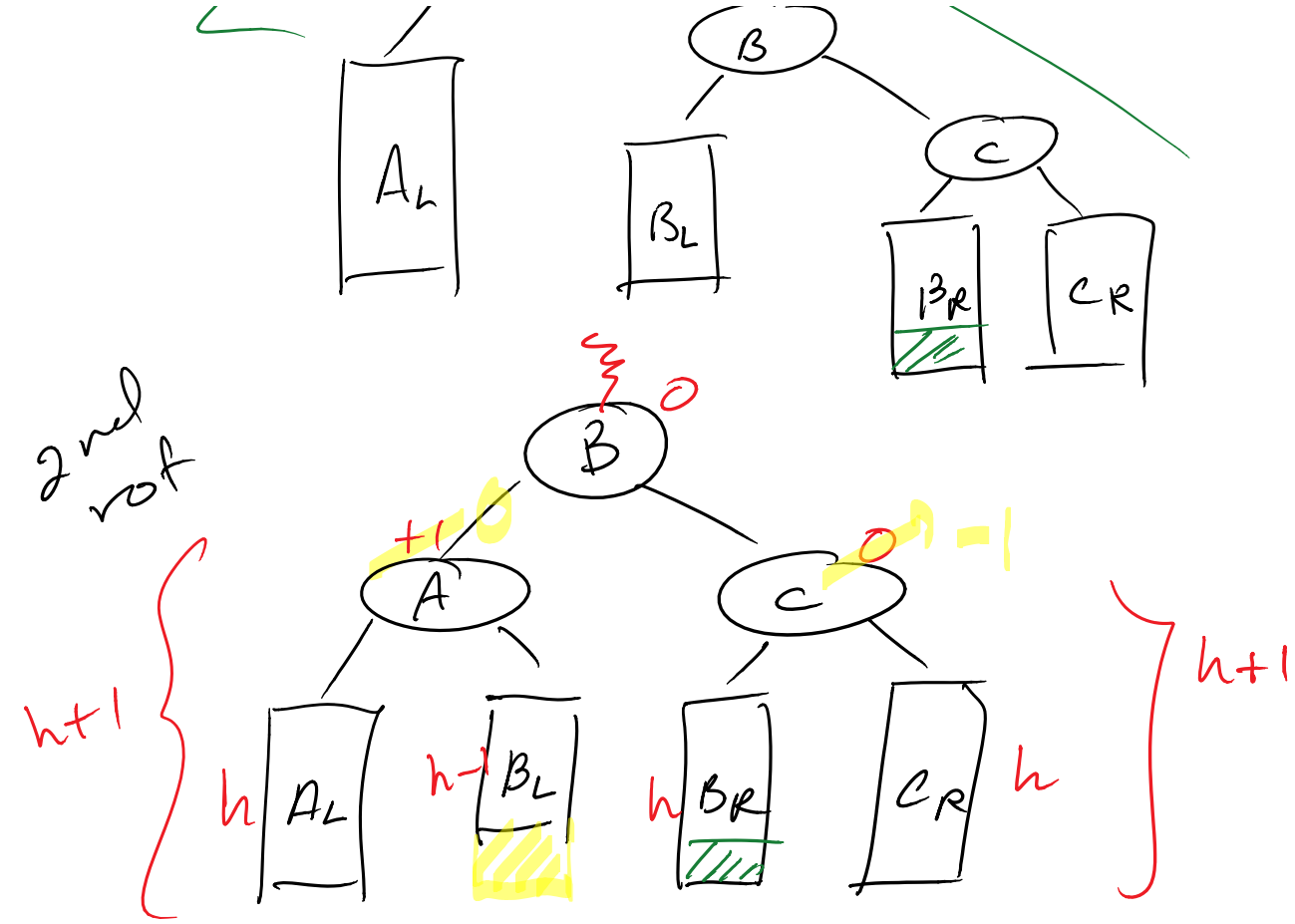

B
0
A
0
h+1
h
A_L
h
B_L
B_R
h
h+1

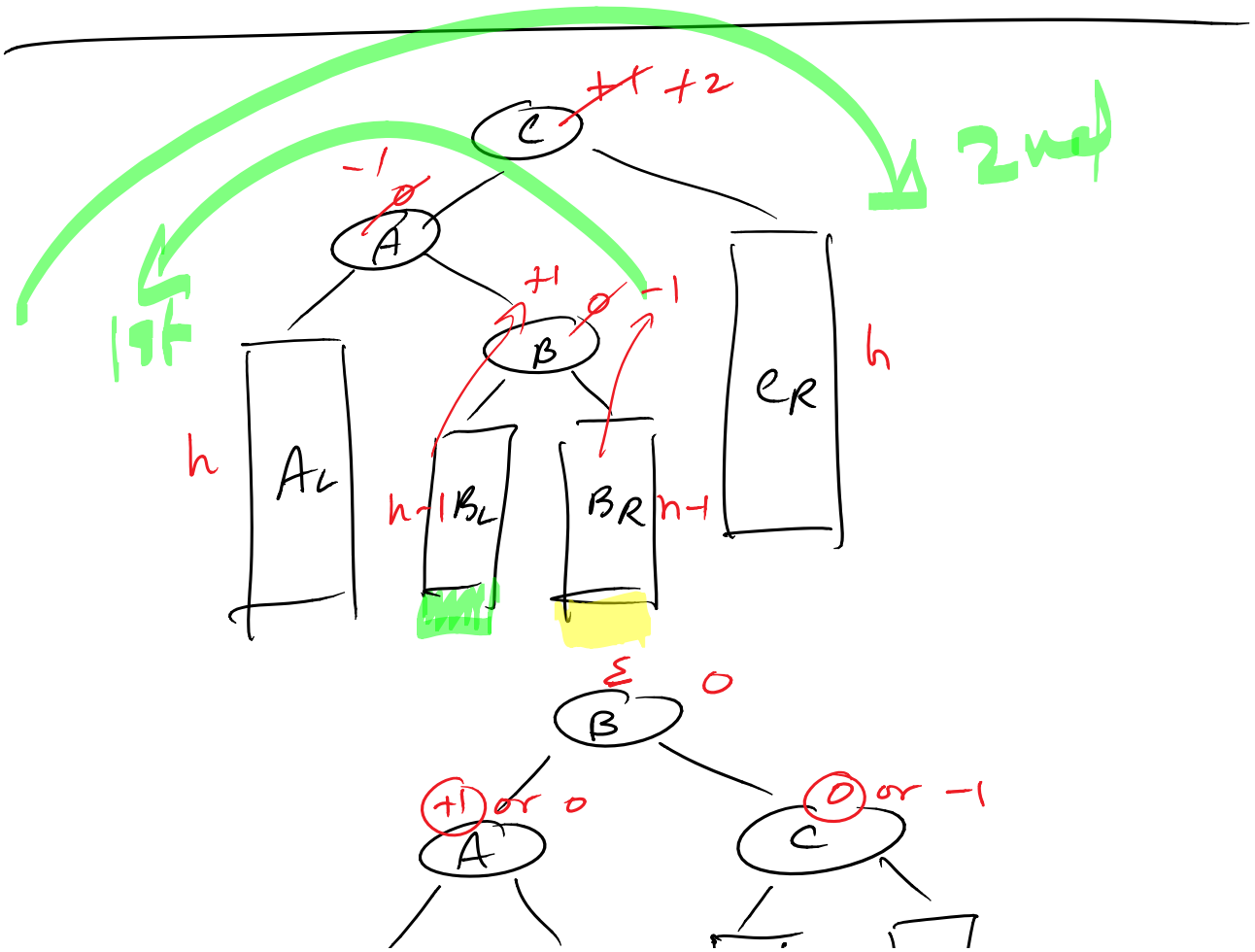

+1
+2
pivot
B
+1
single

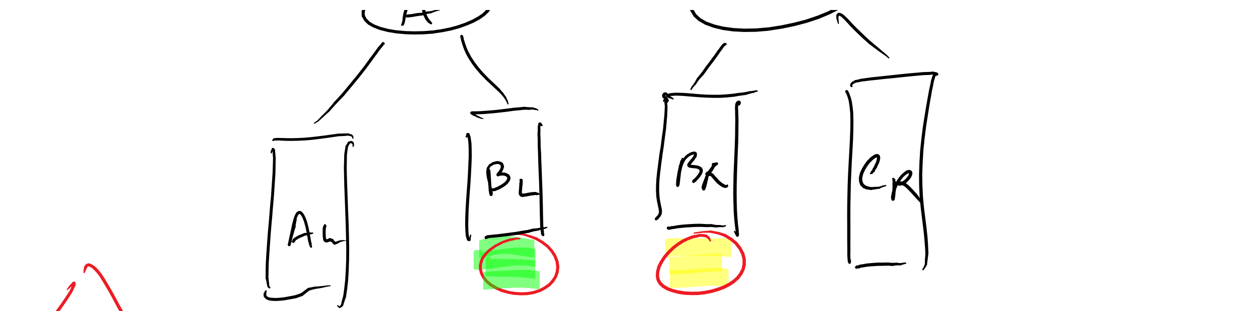

single right rotation
A
A_L
A_R
B_R
h
h
h
h+1
h+2
+1
0

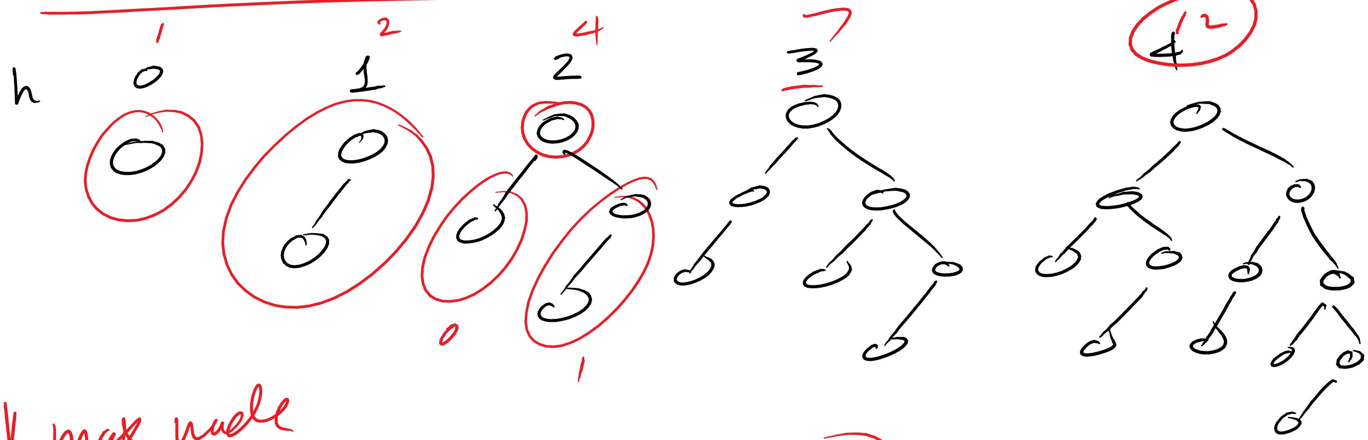

A
B
A_L
A_R
B_L
h+1
h
h
h+1
0
0


2nd rot.
1st rot.
A
C
B
A_L
B_L
B_R
C_R
h
h
h-1
h-1
h
h+1
-1
-2
0
+1
-1
0
181
double left rotation


B
A_L
B_L
C
B_R
C_R
2nd root
0
+1
0
-1
h+1
h
A_L
h-1
B_L
h
B_R
C_R
h
h+1


+1 +2
C
-1
0
A
+1
0
-1
B
2nd
left
h
A_L
h-1
B_L
B_R
h-1
C_R
h
0
B
+1 or 0
0 or -1
A
C





max node

1   3   7   15   31

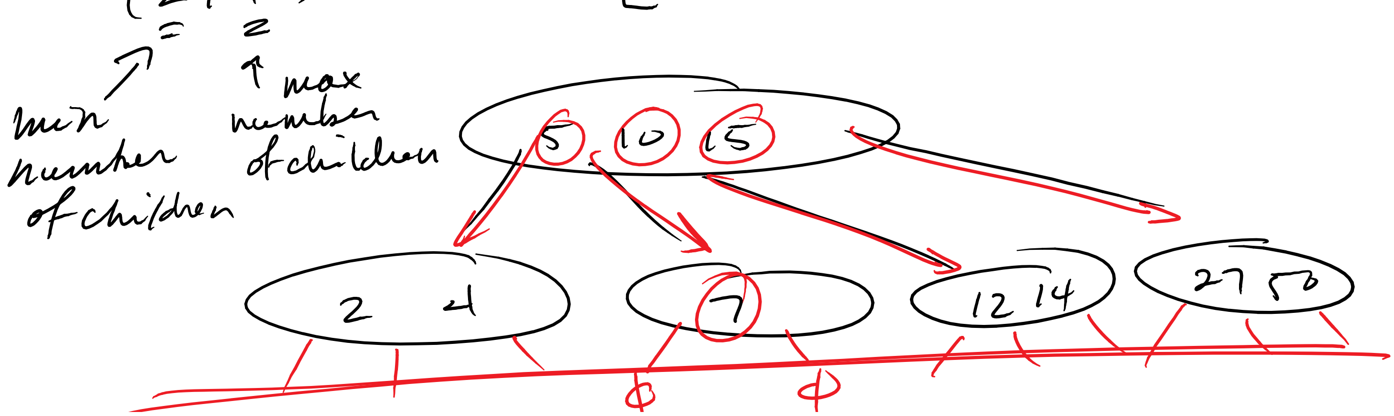
$2^{1-1}+1$ $2^{2+1}-1$ $2^{3+1}-1$ $2^{4+1}-1$

Search, insert, delete $\Theta(\log n)$

insert – at most requires 1 rotation

delete – at most $\log n$ rotation

(2, 4) Tree   [B tree of order m]



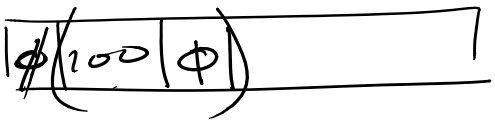
All Keys in $t_i < k_i$

$t_0\ (k_1, t_1)\ (k_2, t_2)\ (k_3, t_3)\ (k_4, t_4)$ ∞

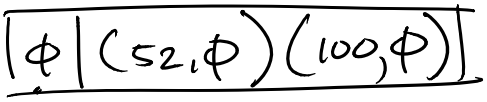
All values in $t_{i-1} < k_i$

All values in $t_i \geq k_i$

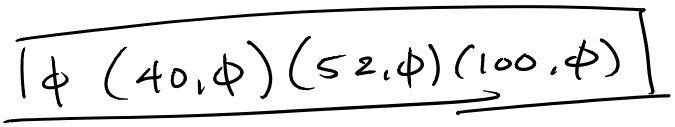
And $k_i \leq k_{i+1}$ for $i = 1 \ldots 3$



$(52, \phi)$

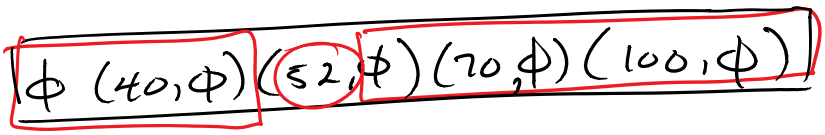


$(40, \phi)$

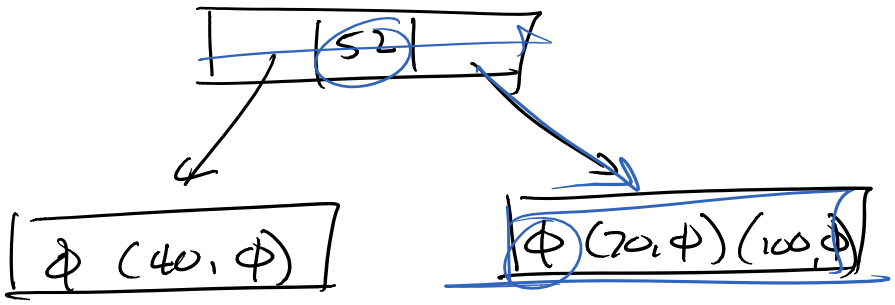


4/2 = ②

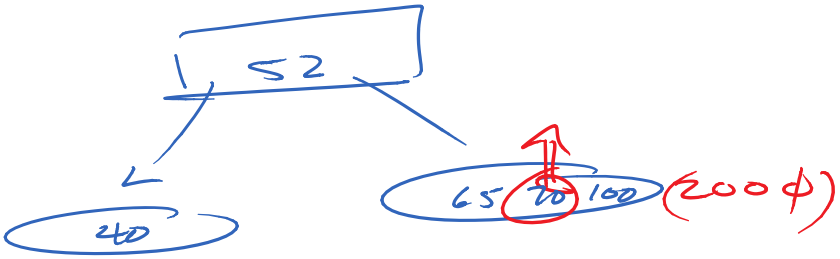
$(70, \phi)$

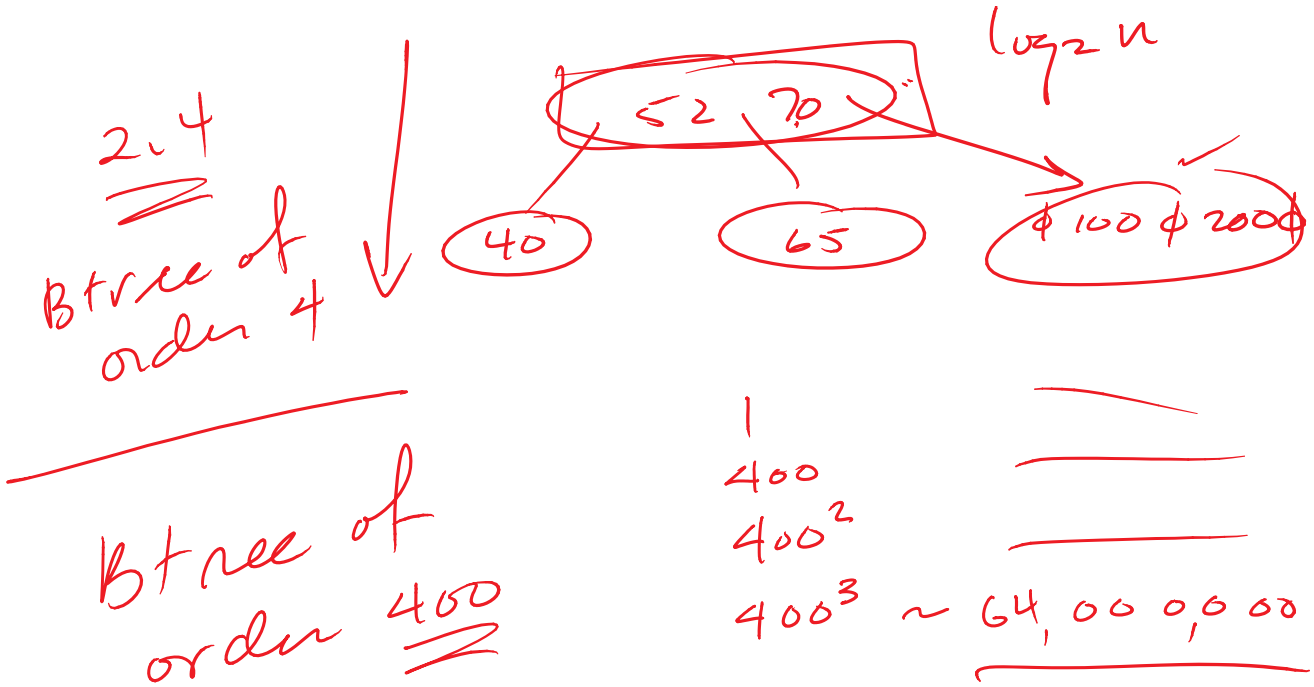


65



200





Btree of order 400

1
400
400^2
$400^3 \sim 64,000,000$