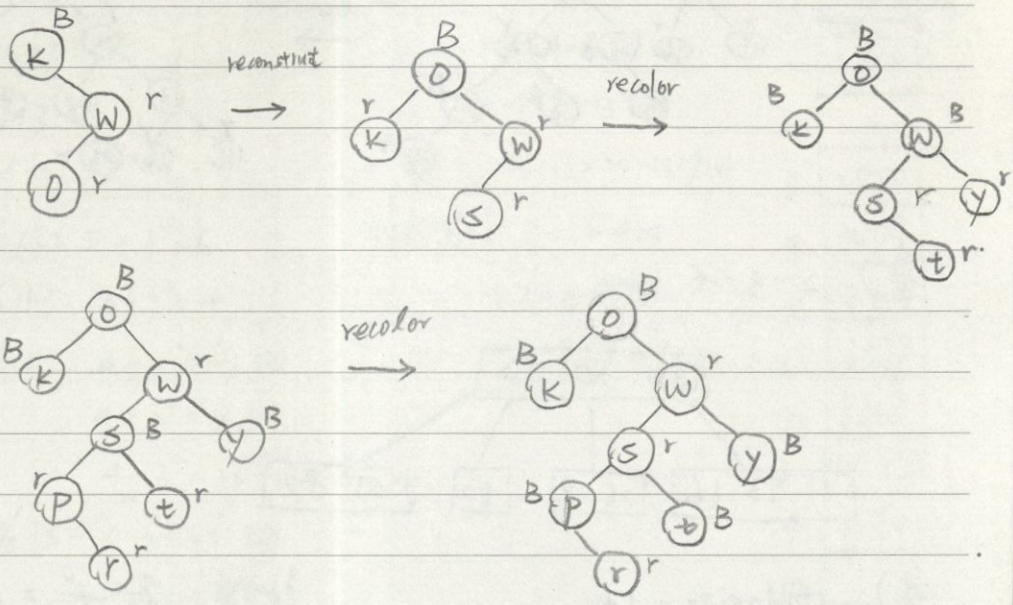
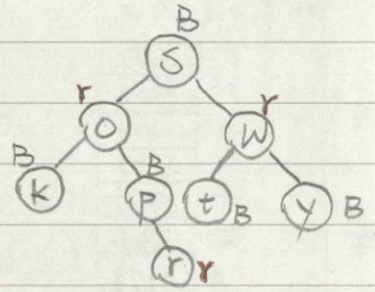
Data Structure
Assignment 5

NO. SHIH-HAN WANG
DATE 2021/3898/48

1)



reconstruct



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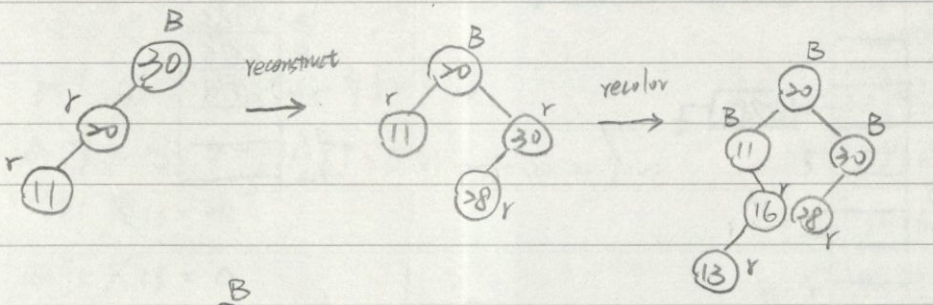
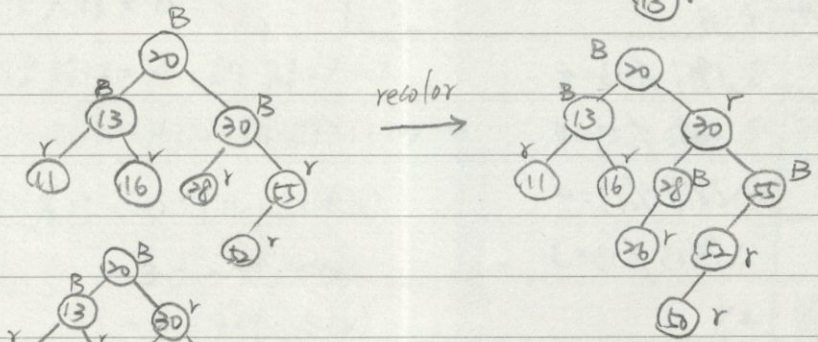
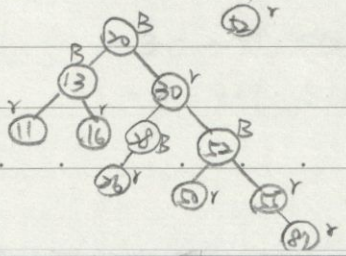
2)



reconstruct



reconstruct



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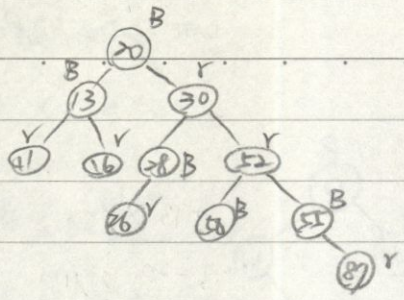
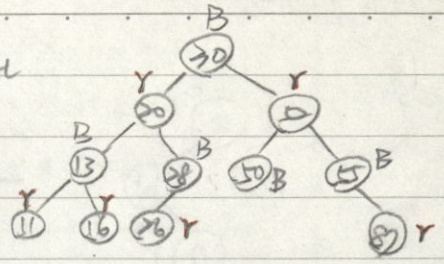
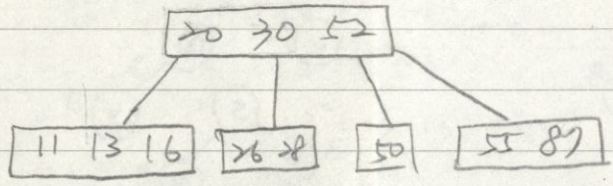
recolor →



reconstruct →

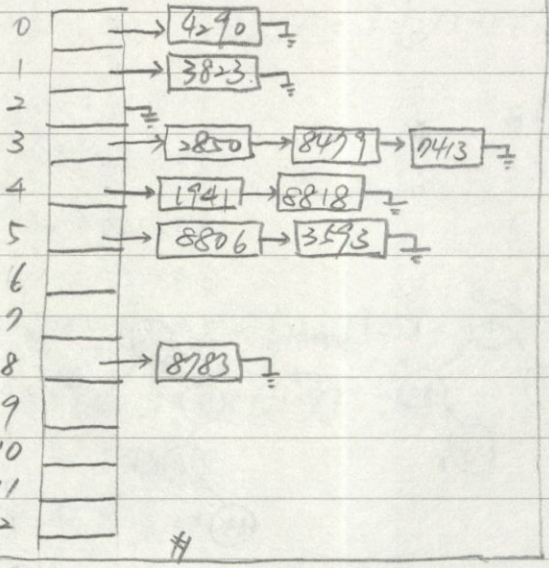


3) 2-3-4 tree



4) tablesize = 13

$h(x) = x \bmod 13$



5) $\lambda = \frac{10}{13} = 0.77$

0	4990
1	3813
2	
3	2850
4	8479
5	8806
6	3593
7	1941
8	8783
9	8818
10	1413
11	
12	

#

3813 % 13 = 1

8806 % 13 = 5

8783 % 13 = 8

2850 % 13 = 3

3593 % 13 = 5

8479 % 13 = 3

1941 % 13 = 4

4990 % 13 = 0

8818 % 13 = 4

1413 % 13 = 3

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$f(i) = i^2$

6) $3833 \% 13 = 1$

$8806 \% 13 = 5$

$8783 \% 13 = 8$

$2850 \% 13 = 3$

$3593 \% 13 = 5 + 1^2 = 6$

$8479 \% 13 = 3 + 1^2 = 4$

$1941 \% 13 = 4 + 1^2 = 5$ (x)

$4 + 2^2 = 8$ (x)

$4 + 3^2 = 13 - 13 = 0$ (v)

$4290 \% 13 = 0 + 1 = 1$ (x)

$= 0 + 2^2 = 4$ (x)

$= 0 + 3^2 = 9$ (v)

$8818 \% 13 = 4 + 1 = 5$ (x)

$= 4 + 4 = 8$ (x)

$= 4 + 9 = 13$ (x)

$= 4 + 16 = 20 - 13 = 7$ (v)

$7413 \% 13 = 3 + 1 = 4$ (x)

$= 3 + 4 = 7$ (x)

$= 3 + 9 = 12$ (v)

0	1941
1	3833
2	
3	2850
4	8479
5	8806
6	3593
7	8818
8	8783
9	4290
10	
11	
12	7413

7) $f(i) = i \times hash_2(x) = i[11 - (x \bmod 11)]$

$3833 \% 13 = 1$

$8806 \% 13 = 5$

$8783 \% 13 = 8$

$2850 \% 13 = 3$

$3593 \% 13 = 5 + [11 - 7] = 9$ (v)

$8479 \% 13 = 3 + [11 - 9] = 5$ (x) $\rightarrow 3 + 2 \times 2 = 7$ (v)

$1941 \% 13 = 4$

$4290 \% 13 = 0$

$8818 \% 13 = 4 + [11 - 7] = 8$ (x)

$= 4 + 2 \times [11 - 7] = 12$ (v)

$7413 \% 13 = 3 + [11 - 10] = 4$ (x)

$= 3 + 2 \times 1 = 5$ (x)

$= 3 + 3 \times 1 = 6$ (v)

0	4290
1	3833
2	
3	2850
4	1941
5	8806
6	7413
7	8479
8	8783
9	3593
10	
11	
12	8818

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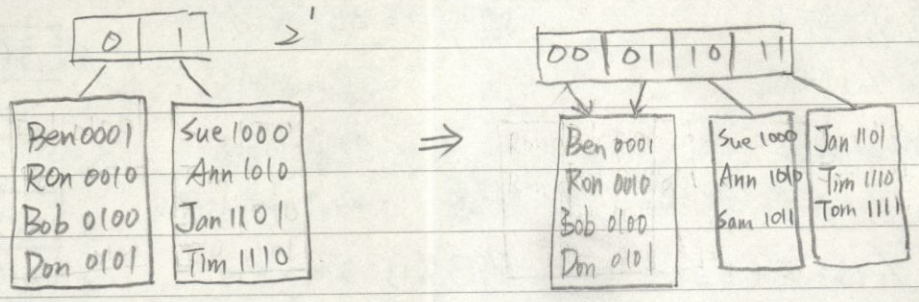
8)


0 | 1
Ben 0001
Ron 0010
Bob 0100
Don 0101
Sue 1000
Ann 1010
Jan 1101
Tim 1110
00 | 01 | 10 | 11
Ben 0001
Ron 0010
Bob 0100
Don 0101
Sue 1000
Ann 1010
Sam 1011
Jan 1101
Tim 1110
Tom 1111

#

9)

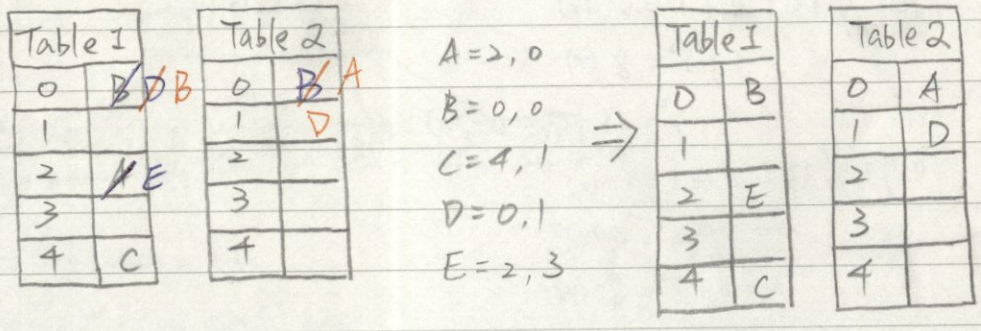
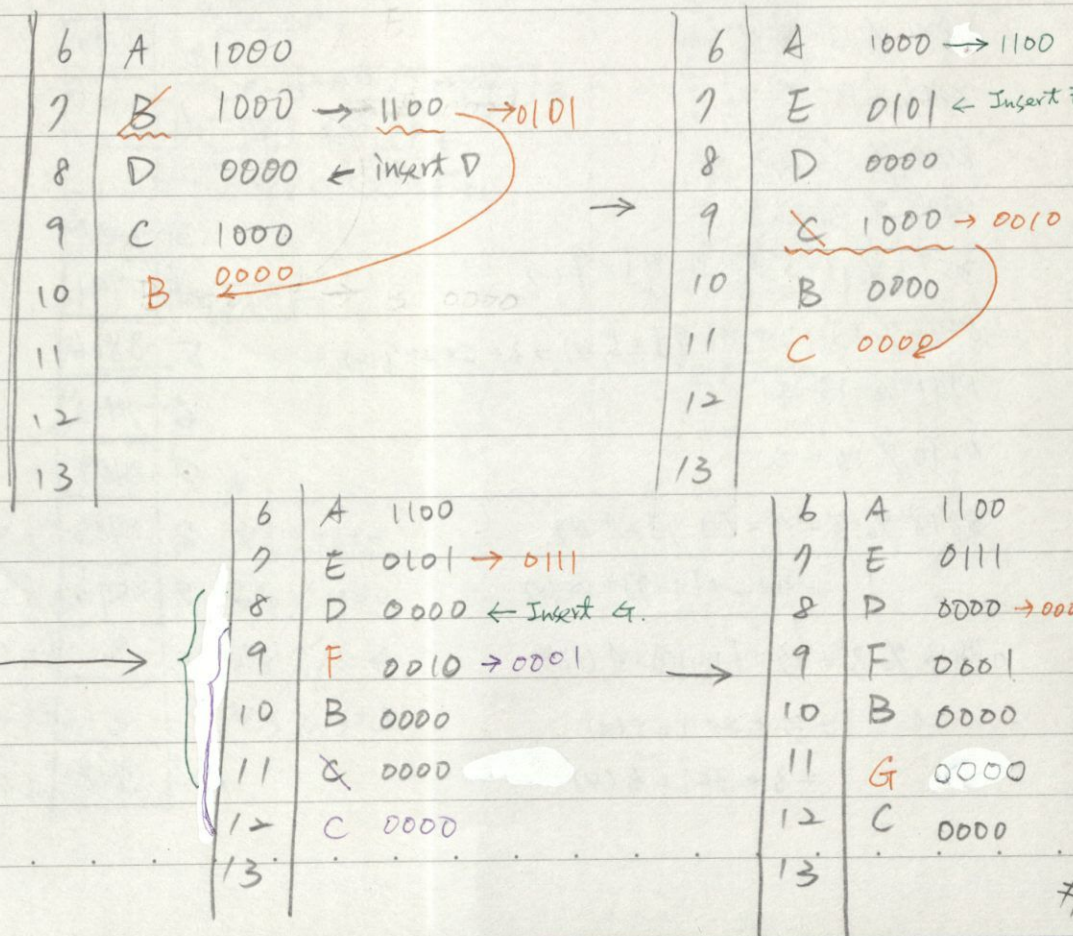


Table 1
Table 2
A = 2, 0
B = 0, 0
C = 4, 1
D = 0, 1
E = 2, 3
Table 1
Table 2

#

10)


1000
1000 → 1100 → 0101
insert D
0000
1000
0000
1000 → 1100
0101 ← Insert E
0000
1000 → 0010
0000
0000
1100
0101 → 0111
0000 ← Insert G.
0010 → 0001
0000
0000
0000
0111
0000 → 0001
0001
0000
0000
0000

#