$$
\begin{array}{c|ccccccccc}
 & 0 & 1 & 2 & 3 & 4 & 5 & 6 & 7 & 8 \\
\hline
0 & 0 & 1 & 1 & 1 & 0 & 0 & 0 & 0 & 0 \\
1 & 1 & 0 & 0 & 1 & 1 & 0 & 0 & 0 & 0 \\
2 & 1 & 0 & 0 & 1 & 0 & 1 & 0 & 0 & 0 \\
3 & 1 & 1 & 1 & 0 & 0 & 0 & 1 & 1 & 0 \\
4 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 & 0 \\
5 & 0 & 0 & 1 & 0 & 0 & 0 & 0 & 0 & 0 \\
6 & 0 & 0 & 0 & 1 & 0 & 0 & 0 & 1 & 1 \\
7 & 0 & 0 & 0 & 1 & 0 & 0 & 1 & 0 & 0 \\
8 & 0 & 0 & 0 & 0 & 0 & 0 & 1 & 0 & 0
\end{array}
$$

DFS:

$V_0 \to V_1 \to V_3 \to V_2 \to V_5 \to V_6 \to V_7 \to V_8 \to V_4$

BFS:

$V_0 \to V_1 \to V_2 \to V_3 \to V_4 \to V_5 \to V_6 \to V_7 \to V_8$

adjacency list

0 → 1 → 2 → 3 ^
1 → 0 → 3 → 4 ^
2 → 0 → 3 → 5 ^
3 → 0 → 1 → 2 → 6 → 7 ^
4 → 1 ^
5 → 2 ^
6 → 3 → 7 → 8 ^
7 → 3 → 6 ^
8 → 6 ^
^ ^

{32, 13, 49, 24, 38, 21, 4, 12}

H(k) = 3K mod 11   the size of hash table is 11.

~~① H(32) = 8~~ ① H(32) = 96%11 = 8, the hash[8] is empty, can be placed.

② H(13) = 39%11 = 6, the hash[6] is empty, can be placed.

③ H(49) = 147%11 = 4, the hash[4] is empty, can be placed.

④ H(24) = 72%11 = 6, not empty, can't be placed.

H(24) = (72+1)%11 = 7, hash[7] is empty, can be placed.

⑤ H(38) = 114%11 = 4, not empty, can't be placed.

H(38) = (114+1)%11 = 5, hash[5] is empty, can be placed.

⑥ H(21) = 63%11 = 8, not empty, can't be placed.

H(21) = (63+1)%11 = 9 hash[9] is empty, can be placed.

⑦ H(4) = 12%11 = 1, hash[1] is empty, can be placed.

⑧ H(12) = 36%11 = 3, hash[3] is empty, can be placed.

0	1	2	3	4	5	6	7	8	9	10
	4		12	49	38	13	24	32	21	

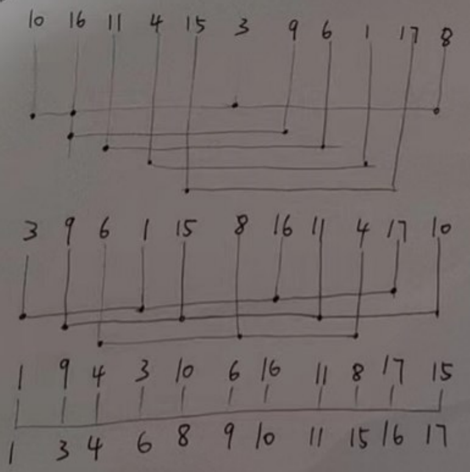
$$ASL_{succ} = \frac{1}{8}(1+1+1+2+2+2+1+1) = \frac{11}{8}$$

$$ASL_{unsucc} = \frac{1}{8}(1+2+1+8+7+6+5+4+3+2+1) = \frac{40}{8} = 5$$

$\therefore ASL_{succ} = \frac{11}{8}$

$ASL_{unsucc} = \frac{40}{8} = 5$

(1)



merge sort step:

(2) ~~If the input list contains~~

① If the array contains only one element, return

② divide the array into two smaller subarrays.

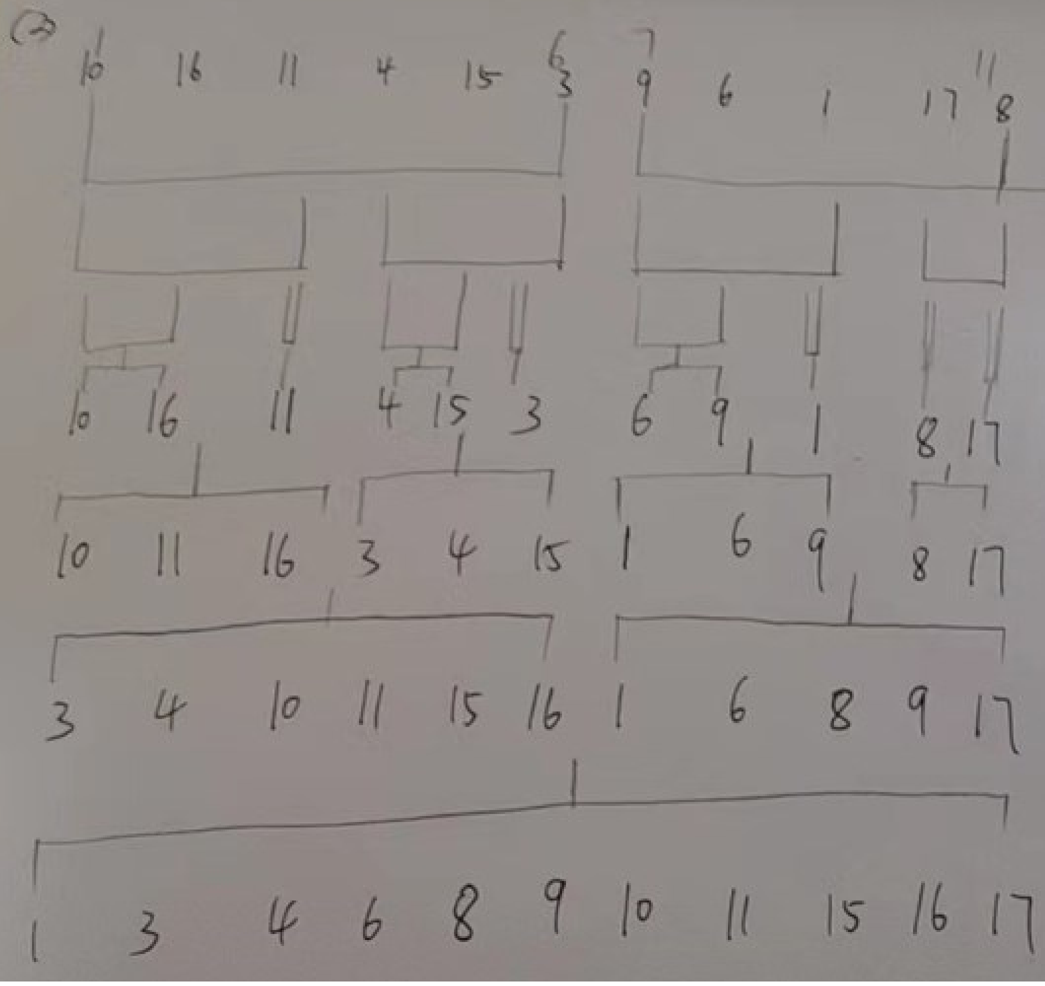
③ sort the left and the right sub arrays recursively using the merge sort

④ merge the left and right sub arrays back together, ensuring that the resulting array is in sorted order.

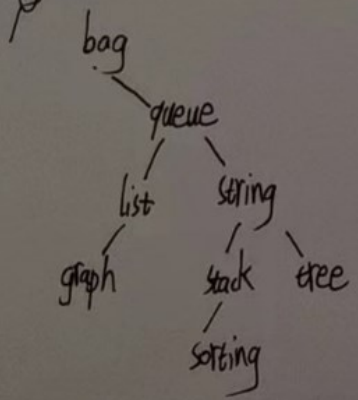
(3) return of first pass of quick sort:

1 3 11 4 15 16 9 6 10 17 8

(2)



~~bag~~ (1)



(2) Binary Sort Tree

$\frac{26}{8}$ $\frac{13}{4}$

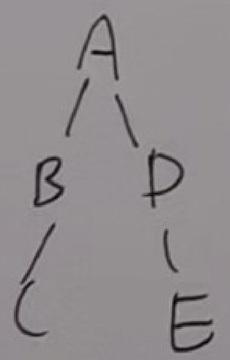
13 17. 11.

(3) $ASL = \frac{1}{8}(1+2+3+3+4+4+4+5) = \frac{13}{4}$

∵ the preorder traversal of a binary tree is ABCDE

∵ the postorder traversal of a binary tree is CBEDA

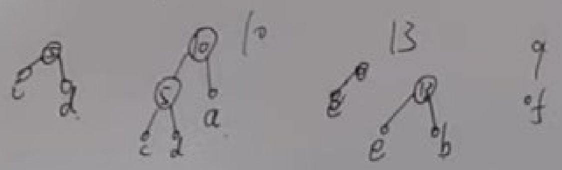
∴

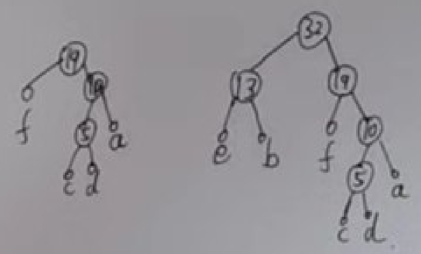


so the inorder is

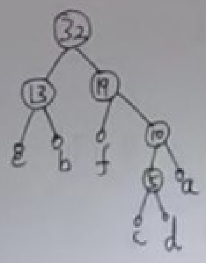
CBADE

{a,b,c,d,e,f}
{5,7,2,3,6,9}



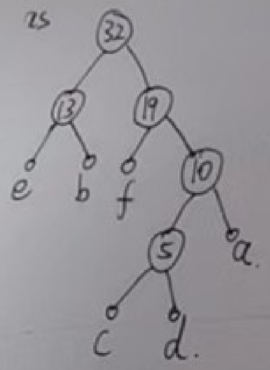


∴ the Huffman tree is



a: 111
b: 01
c: 1100
d: 1101
e: 00
f: 10

∴ the Huffman tree is



a: 111
b: 01
C: 1100
d: 1101
e: 00
f: 10