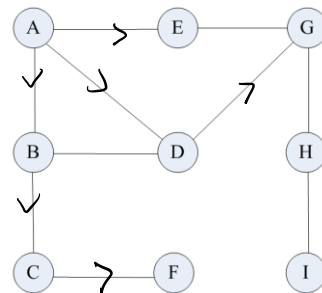


2、本试卷审批表同试卷一并归档保存。

- A.  $T \rightarrow \text{next} = R; T = R;$   
 B.  $R \rightarrow \text{next} = S; S = R;$   
☒ C.  $S \rightarrow \text{next} = R; S = R;$   
 D.  $R \rightarrow \text{next} = t;$
4. Given a non-empty BST, (A) means that the node in the tree has the minimum value.  
☒ A. Its pointer to the left child is empty.  
 B. Its pointer to the right child is empty.  
 C. Both pointers to the two children are empty.  
 D. Both pointers to the two children are not empty.
5. We sort  $n$  records using Radix Sort algorithm. If the key has  $d$  digits and the base is  $r$ , then (B) passes are required to sort these records.  
 A.  $n$   
☒ B.  $d$   
 C.  $r$   
 D.  $n-d$
6. In external sorting, a run is (A).  
☒ A. A sorted sub-section for a list of records.  
 B. One pass through a file being sorted.  
 C. The external sorting process itself.  
 D. The replacement selection process.
7. A good hash function will (D).  
 A. Use the high-order bits of the key value.  
 B. Use the middle bits of the key value.  
 C. Use the low-order bits of the key value.  
 D. Make use of all bits in the key value.
8. The single-source shortest path problem can be used to (C).  
 A. Sort all of the graph vertices by value.  
 B. Sort all of the graph vertices so that each vertex is listed prior to any others that depend on it.  
 C. Sort all of the graph vertices by distance from the source vertex.  
 D. Compute the shortest path only for directed graph.
9. In the following sort algorithms, which might require the maximum running time cost for an ordered sequence? (C)  
 A. Selection sort  $\rightarrow$  交换  $O$   
 B. Bubble sort  $\rightarrow$  交换  $O$   
☒ C. Quicksort  $\rightarrow$  交换  $O(n^2)$  比较  $O(n^2)$

- D. Insertion sort  $\rightarrow$  比较  $\Theta(n)$  交换 0
10. The asymptotic cost of inserting and deleting of one record from B+-tree trees is (D)?
- A.  $\Theta(n)$   
B.  $\Theta(n \log n)$   
C.  $\Theta(n^2)$   
D.  $\Theta(\log n)$
11. Which is the max-heap that results from running BuildHeap on the following values stored in an array: 46, 79, 56, 38, 40, 84? (B)
- A. 79, 46, 56, 38, 40, 84  
B. 84, 79, 56, 38, 40, 46  
C. 84, 79, 56, 46, 40, 38  
D. 84, 56, 79, 40, 38, 46
12. The figure below shows an undirected graph with 9 vertices. List the order in which the vertices are visited using breadth-first search (BFS), starting at Vertex A.
- (D) A B D E C G F H I
- A. ABCFDGEHI  
B. ABDECGFHI  
C. ABDECGHIF  
D. ABDECGFHI
- 
13. Hashing is most appropriate for (C).
- A. In-memory applications.  
B. Disk-based applications.  
C. Either in-memory or disk-based applications.  
D. None of the above.
14. Assume a BST is implemented so that all nodes in the left subtree of a given node have values less than that node, and all nodes in the right subtree have values greater than or equal to that node. When implementing the delete routine, we must select (B) as its replacement.
- A. The greatest value from the left subtree.  
B. The least value from the right subtree.  
C. Either of the above.  
D. None of the above.
15. An algorithm must be or do all of the following EXCEPT (C).
- A. correct  
B. composed of concrete steps  
C. ambiguous



的查询应用程序,散列方法通常是最快选择的检索方法。因为如果实现得正确,它的效率会非常高。然而,在本章就会看到,有许多实现散列的方法,很容易设计出效率很低的实现。散列方法既适合基于主存的检索,也适合基于磁盘的检索。组织存储在磁盘上的大型数据库有两个广为使用的方法,散列方法是其中之一(另一种方法是B树,将在第10章介绍)。

D. composed of a finite number of steps

评阅教师	得分

二、应用题（本大题共 4 小题，1-2 每小题 8 分，3-4 每小题 9 分，共 34 分）

提示：有求解过程的要尽量给出解题步骤，只有最终答案会酌情扣分。

- The order of input data makes a difference to running time of Quicksort.
  - For the values 1 through 15, give two permutations that will cause Quicksort to have its best case and worst case behaviors. (By default, Quicksort is implemented as in Section 7.5 of textbook. Otherwise, you'd better point which one is pivot.)
  - How many partitions should be done to complete the Quicksort in best case and worst case for the values 1 through 15?
- Assume that you have a 9 slots closed hash. If you used the hash function  $h(k) = k \% 9$  and pseudo-random probing, here the pseudo-random probing sequence  $d_i$  will be: 5, 9, 2, 1, 4, 8, 6, 3, 7.
  - Show the final hash table after inserting the number sequence: 3, 27, 15, 72, 60, 12.
  - After filling the above numbers, calculate the probability for each empty slot that it will be the next one filled.
  - Determine the ASL(平均关键字比较次数) when searching sequence 3, 27, 15, 72, 60, 12, 54 in the hash table
- Given the following set of letters and weights:
 

Letter	a	b	c	k	l	o	r	t	e	d
Weight	2	36	5	30	7	9	13	16	18	3

  - Build the Huffman coding tree.
  - Determine the Huffman code for each letter.
  - Represent the word "broke" by bit stream using the code in (b).
- You are given a series of records whose keys are numbers. The records arrive in the following order: 36, 69, 53, 84, 23, 18, 61, 50, 79, 45. Show the 2-3 tree that results from inserting these records.

评阅教师	得分

三、编程、设计及分析题（本大题共 2 小题，1 小题 8 分，2 小题 12 分，共 20 分）。

提示：每小题给出了一个程序设计要求，请按照要求写出源程序代码，如果源程序代码中

出现语法错误或逻辑错误, 则酌情扣分。

1. Write a function that prints out the node values for a BST in sorted order from highest to lowest.
2. You are given a linked list **L**, and another linked list **P**, containing integers sorted in ascending order. The operation **PrintLots(L, P)** will print the elements in **L** that are in positions specified by **P**. For instance, if **P** = 1, 3, 4, 6, the first, third, fourth, and sixth elements in **L** are printed. Write the function **PrintLots(L, P)**. What is the running time of your algorithm?

评阅教师	得分

#### 四、分析题 (本大题共 1 小题, 共 16 分)。

提示: 本题无标准答案, 你可以根据自己的理解和知识背景, 对题目给出分析和阐述。

Think of the WeChat(微信) system. In your opinions which data structures and algorithms are used in some typical functions of WeChat?

1. (1) 求最佳顺序, 设该 15 个数列顺序 (1~15)

$$\begin{array}{ccccccc}
 A & B & C & D & E & F & G & H & I & J & K & L & M & N & O=8 \\
 \hline
 & & & & & & & & & & & & & & H \\
 \hline
 & & & & & & & & & & & & & & 12 \\
 \hline
 & & & & & & & & & & & & & & 12
 \end{array}
 \quad \frac{1+15}{2} = 8$$

前者  $\frac{1+7}{2} = 4$      A B C ⊕ E F D  
                                  1 3 2     5 7 6

后者  $\frac{9+15}{2} = 12$      I J K ⊕ M N L  
                                  9 11 10     13 15 14

∴ 顺序为 1 3 2 6 5 7 4 12 9 11 10 14 13 15 8



# 四川大學

Sichuan University Chengdu, China

2018 ~ 2019

A卷

~~二、pivot为最左边的值~~

~~设该数顺序为: a, b, c~~

易错

a) pivot为最右边的值

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15  
1 3 2 6 5 7 4 12 9 11 10 13 15 14 8

best case: ~~8 7 9 6 10 5 11 4 12 3 13 2 14 15~~

worst case: 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15

b) best case: 7次分划

worst case: 14次分划

共15个数, 最坏15次分划

2, 0 1 2 3 4 5 6 7 8

a) 

27		60	3		72	15		12
----	--	----	---	--	----	----	--	----

b) 将下一个数的哈希值为m

若  $m=5: 5 \rightarrow 1$

若  $m=0$ , 落入 slot:  $0 \rightarrow 5 \rightarrow 5 \rightarrow 7$

若  $m=6: 6 \rightarrow 2 \rightarrow 2 \rightarrow 4$

若  $m=1$ , 落入 slot: 1

若  $m=7: 7 \rightarrow 0$

若  $m=2$ , 落入 slot:  $2 \rightarrow 7$

若  $m=8: 8 \rightarrow 4$

若  $m=3$ , 落入 slot:  $3 \rightarrow 8 \rightarrow 8 \rightarrow 1$

若  $m=4$ , 落入 slot: 4

$\therefore$  落入 slot 1 概率:  $3/9 = 1/3$

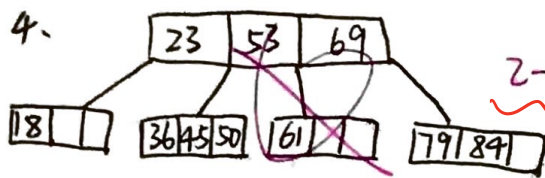
落入 slot 4 概率:  $3/9 = 1/3$

落入 slot 7 概率:  $3/9 = 1/3$

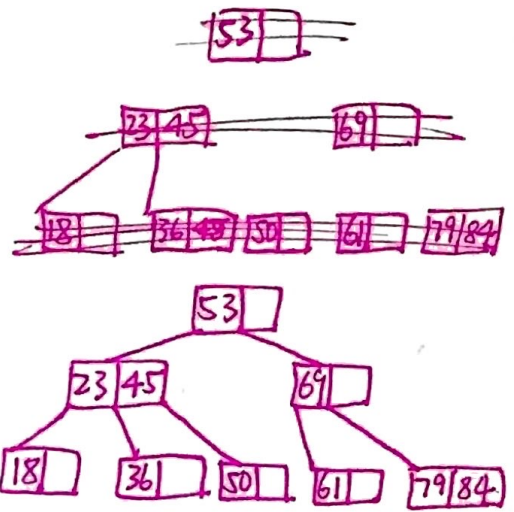
c) 总比较 ASL =  $\frac{1}{7} (1+1+1+2+2+2+4) = \frac{12}{7}$

54 未找到





2-3树只有外框



三. 1. void PrintOrder(BSTNode<Elem>\* root) {  
 if (root == NULL) return;  
 PrintOrder(root->rightChild());  
 cout << root->getValue() << endl;  
 PrintOrder(root->leftChild());  
}

~~2. void PrintLots(LList L, LList P) {  
 while (P.length() != 0) {  
 int i = P.moveToStart();  
 int j = P.remove();  
 cout << L.moveToPos~~

2. void PrintLots(LList L, LList P) {  
 for (P.moveToStart(); P.currPos() < P.length(); P.next()) {  
 cout << L.getValue(~~i~~);  
 L.moveToPos(P.getValue());  
 cout << L.getValue();  
 }

$$T(n) = \frac{\theta(n)}{2} \quad (n \text{ 为 } P \text{ 的元素个数})$$

四. 略.

好友列表顺序 → ~~排序~~ 内排序算法 (关键字为好友昵称)

微信文件目录 → 树状结构.  
 相关

微信朋友圈 → 图