1) Traverse a given 2D matrix from given source to destination in such way that every cell should be visited exactly one time (we have to cover all cells of matrix exactly once and have to reach at destination).

2) If m is a number then i right rotation of that number is mi. Ex m = 123 then m1 = 312, m2 = 231.

Now you have given 2 numbers as input say x and y. You have to count all m numbers between them such that x <= m < mi <= y.

Ex if x = 123 and y = 250 then for m = 123, m1= 312 and m2 = 231 so,

X <= m < m1 <= y is not valid

X <= m < m2 <=y is valid. And so on..

How do you find out the cause of a slow UI request?

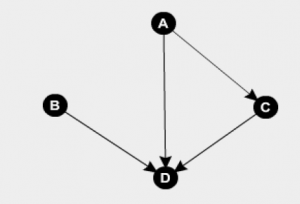
Write function to convert a stream of incoming characters to an integer.

Write function to convert one character to one digit number.

Write a url shortner. Design scalable architecture that host this service.

Array vs linked list. Rest vs Soap. What is a hashtable? Write code to handle hashtable collisions?

You were given a directed graph with n nodes. Given graph was connected. If there is an edge from u to v then u depends on v. Our task was to find out the sum of dependencies for every node.

[](http://d2o58evtke57tz.cloudfront.net/wp-content/uploads/flipkartinterview1.png)  
Example:

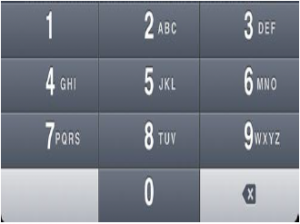
For the graph in diagram, A dependencies: C,D i.e. 2  
B dependencies: D i.e. 1  
C dependencies: D i.e. 1  
And D depends on none.  
Hence answer=0+1+1+2=4.

Given two very large numbers a & b in string format. You need to produce the result for the following operation:  
0 : Add a & b  
1: Subtract a & b  
2: Multiply a & b

Example:  
123456789  
987654321

Output:  
0 ==> 1111111110  
1 ==> -864197532  
2 ==> 1219326313718945259

Few cases were checked specifically:  
1) Output of 132-132 must be 0 not 000.  
2) 2 – 122222000002 should produce -122222000000 i.e either a or b can be the bigger string.  
3) Negative input should be handled. Result of -2+202 = 200.  
4) 1000000000 – 1 = 999999999 i.e. resulting answer can be of different length.

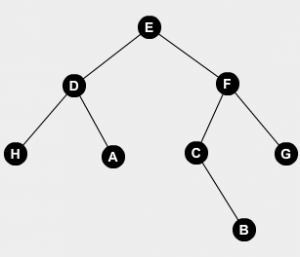
 Given the mobile numeric keypad. You can only press buttons that are up,left,right or down to the current button.You are not allowed to press bottom row corner buttons (i.e. \* and # ). [](http://d2o58evtke57tz.cloudfront.net/wp-content/uploads/flipkartinterview2.png)Given a N find out the number of numbers possible of given length. It was asked to write the code.

Example:  
For N=2  
Possible numbers: 00,08 11,12,14 22,21,23,25 and so on. We have to print the count of such numbers.  
I solved it using DP in first attempt. He was quite impressed as I took very less time to think of the exact solution.

 Given a undirected graph with following special points:  
1) Every node has at most 3 links.  
2) Node with a single link is a leaf node.  
3) Nodes are numbered from 1 to N.  
(Think how is it different from a 3-ary Tree, See bold text :P )  
We do the following operation on the given graph: Among all the current leaf nodes we search for the node with minimum node value, delete it and print its parent. We do this operation until only two nodes are left in the graph.  
If your are given N and an array having the printed values from the operation, you have to generate the graph back. Exact implementation was asked to write.

Example:  
N = 8

ar[]= {4,3,6,6,5,4}

Output should be adjacency matrix for the following graph.  
[](http://d2o58evtke57tz.cloudfront.net/wp-content/uploads/flipkartinterview3.png)

You are given an infinite sorted array containing only numbers 0 and 1. Find the transition point efficiently.

Flatten linked list – <http://www.geeksforgeeks.org/flatten-a-linked-list-with-next-and-child-pointers/>

Design a data structure which holds number 1 to n such that insert, remove(this operation will take in a number between 1 to n as argument and remove that number from data structure if it exists) and get valid element in the data structure operations are done with O(1) complexity

Find and print longest consecutive number sequence in a given sequence

Ex: Input: 1 2 5 3 6 8 7

Output: 5 6 7 8

3) A fair die is thrown k times. What is the probability of sum of k throws to be equal to a number n?

User statistics are logged in the following format –

user\_id|page|time at which page was accessed

We need to identify most followed 3 page sequence by users.

Example:

Input: U1|Page1|05/08/2014 10:00

U1|Page2|05/08/2014 10:01

U1|Page3|05/08/2014 10:02

U1|Page4|05/08/2014 10:03

U2|Page2|05/08/2014 10:02

U2|Page3|05/08/2014 10:04

U2|Page4|05/08/2014 10:05

U3|Page3|05/08/2014 10:04

U3|Page4|05/08/2014 10:05

U3|Page5|05/08/2014 10:06

Output: Most followed 3 page sequence for the input is

Page2 -> Page3 -> Page4.

**Question 1 (Optimal substring reversal):**  
You are given a string S. Each character of S is either ‘a’, or ‘b’. You wish to reverse exactly one sub-string of S such that the new string is lexicographically smaller than all the other strings that you can get by reversing exactly one sub-string.  
For example, given ‘abab’, you may choose to reverse the substring ‘ab’ that starts from index 2 (0-based). This gives you the string ‘abba’. But, if you choose the reverse the substring ‘ba’ starting from index 1, you will get ‘aabb’. There is no way of getting a smaller string, hence reversing the substring in the range [1, 2] is optimal.

Input:  
First line contains a number T, the number of test cases.  
Each test case contains a single string S. The characters of the string will be from the set { a, b }.

Output:  
For each test case, print two numbers separated by comma; for example “x,y” (without the quotes and without any additional whitespace). “x,y” describe the starting index (0-based) and ending index respectively of the substring that must be reversed in order to acheive the smallest lexicographical string. If there are multiple possible answers, print the one with the smallest ‘x’. If there are still multiple answers possible, print the one with the smallest ‘y’.

Constraints:  
1 ? T ? 100  
1 ? length of S ? 1000

Sample Input:

5

abab

abba

bbaa

aaaa

babaabba

Sample Output:

1,2

1,3

0,3

0,0

0,4

Attention:  
The constraints are designed such that an O(N3) algorithm per test case, would not pass.

**Question 2 (Database Queries): 2 points**  
You have a set of N objects. Each of these objects have certain properties associated with them. A property is represented by a (key, value) pair. For example, assume you have the following two objects.

Tower:

{

(height, 100), (weight, 50),

(xposition, 25), (yposition, 36)

}

Tree:

{

(area, 100), (noofleaves, 500),

(height, 25), (yposition, 36)

}

Each object you have, will have at most 4 properties. An object will have at least 1 property. Note, from the two objects above, that it is not necessary for key in the properties to be same for all the objects. Also, it is not necessary for the key to be different.  
Now, given N such objects, you wish to answer M queries. Each query is represented by a set of properties (again, at most 4 properties, and at least 1 property). The answer for the query is the number of objects in the set, that have all the given properties. Two properties are considered equal iff both the key and the value match.  
For example, if you have the above two objects, then the answer for the following queries is  
Query: { (height, 100), (yposition, 36) }  
Answer: 1 // matches Tower, but not Tree

Query: { (yposition, 36) }  
Answer:2 // matches both Tower and Tree

Query: { (height, 100), (noofleaves, 500) }  
Answer: 0 // neither Tower, not Tree satisfy both properties

Input:  
The first line of input contains N and M. This is followed by the description of the N objects. The description of the i-th object will start by a number k, which is the number of properties associated with the object. The next k lines contain two space separated strings – the property key and the property value. Note that the property value is not necessarily an integer (although this is so for the example above).  
This is followed by the description of M queries. The format of a query will be exactly same to that of the objects. Check the Sample Input for clarification.  
One test file will contain only one test case. A single test case may contain several queries.

Output:  
Print M lines. Each line must be the answer of the respective query.

Constraints:  
1 ? N ? 10000  
1 ? M ? 100000  
1 ? k ? 4

Sample Input

2 3

4

height 100a

weight 50b

xposition 25a

yposition 36b

4

area 100a

noofleaves 500

height 25

yposition 36b

3

weight 80

xposition 25a

yposition 36b

1

yposition 36b

2

xposition 25a

yposition 36b

Sample Output:

0

2

1

1st: Consider a coordinate system consisting of n coordinates from (x1,y1)…..(xn,yn)  
Also there are two values ymin and ymax given to you. You have to return min(D) where D is x^2 + y^2 for all y lying between ymin and ymax inclusive. If there is no such y then return -1.

2nd: Given a number n and a number k. You have to find the next bigger number from n which is obtained after exaclty k swaps.  
Eg: Take n=43592169 and k=5  
1st swap: 43952169  
2nd swap: 49352169  
3rd swap: 94352169  
4th swap: 94532169  
5th swap: 95432169 :- final number.

 A linked list consists of two pointers: a next pointer and a child pointer. We have to make the linked list linear i.e. making all the child pointers NULL.

eg: 1->2->3->4

| |

5->6 8

|

7

answer would be:

1->2->3->4->5->6->8->7.

2. Given a distance n. A person standing at position 0 has to reach n. He can either take 1 step or 2 steps at a time. In how many ways he can reach there.

1. Given a singly linked list you have to subtract the value of first node from the last node and so on until you reach the middle node.

Eg 5 -> 4->3->2 ->1

Output : 4->2->3->2->1.

Some basic questions on operating system concepts like CPU scheduling, why CPU scheduling , advantages , types. Questions on deadlock.

1. Discussion on graph data structure , then asked me to find number of three node cycles in a graph .Write code.

 We have a customer using amazon Kindle , suppose he wants to borrow a book for some days , lets say x and wants to finish reading the book within the days limit. The book contains ,lets say y chapters ,once he starts reading a chapter he has to finish that on the same day . He can read the book only in a sequential manner , you have to tell how many chapters should he read on each day so that he can finish reading the book .

Given a binary tree, change the value in each node to sum of all the values in the nodes on the left side of the node.

Eg 1

/ \

2 3

3

/ \

2 6

Given a string without spaces and a dictionary return or print all possible ways that the string can be broken so that only valid words are formed.

Eg. “programmerit”, dict = { “pro”, “gram”, “merit”, “program”, “programmer”, “it” }

ans: { {“pro”, “gram”, “merit”}, {“program”, “merit”}, {“programmer”, “it”} }

Given a ‘pattern’ and a ‘text’ print the indexes of ‘text’ where any anagrams of ‘pattern’ occur.

Input:

abcdad (text)

abcd (pattern)

Output:

0, 1

Given an array containing integers, modify the array such that the 5’s are at the end and the rest are at the beginning (maintaining the same order).

Given an undirected graph, count the number of cycles with 3 nodes.  
3. What is a spanning tree? Difference from tree, if any.  
4. How to find the minimum spanning tree of a graph?  
5. Given an array convert it to another array such that the following condition holds:  
a < b > c < d > e < f > g < h  
where the modified array is {a,b,c,d,e,f,g,h}  
Input:  
1,2,3,4,5,6  
Output:  
1,3,2,5,4,6

 Design problem: Given a station with n platforms. So each platform has one line. But these n lines join into one, after leaving the platform (on both sides). Each train has to wait a minimum of x minutes in the platform. Trains arrive from both ends. If all the platforms are occupied they wait. There is also a point beyond the end of the platform (on both sides). This point indicates that an incoming train has to wait at that point until a leaving train (from that end) passes that point. Design the whole system.

3. How are big files stored in memory? What are the uses of B-tree? How is it more useful than BST?

4. Given one billion file indexes and said that n files are missing. How would you identify the file indexes of those who are missing?

 Given an array of integers. This array denotes ‘our’ own ascending order of the elements. So if the array is {2,3,1,4}, by mathematics we can say that 2<3<1<4. Given another array, sort this new array in ‘our’ ascending order.  
Let’s say the new array is {1,2,4,3,5,4,9,2}, output will be {2,2,3,1,4,4,5,9}. Note that since 5 and 9 do not occur, they are sorted by actual ascending order at the end.

2. Integers are coming in a stream. A special integer (say -9999) denotes reset. Design a data structure such that when the special integer comes the previous elements are printed in a zigzag way and all the elements are deleted (reset). And then continues to accept other integers. What DS will you use?

Say the input is

1,2,3,4,5,6,7,8,-9999,0,1,100,-9999,-9999,500

Output will be

1,8,2,7,3,6,4,5

0,100,1

Given an array of integers. Segregate all the non-zero numbers at the beginning. Print the number of non-zero integers and the minimum number of swaps required for these operations.

Eg. : I/p : 1, 0, 0, -6, 2, 0

o/p : Number of non-zero integers : 3

Minimum number of swaps : 2

LRU implementation using stack ( I was not allowed to use any other data structure).  
I did it using two stacks.

Given an array : A1[] = 2, 1, 2, 5, 7, 1, 9, 3, 6, 8, 8  
A2[] = 2, 1, 8, 3  
Sort A1 in such a way that the relative order among the elements will be same as those are in A2. If the element is not present in A2, append them at last in sorted order.  
o/p : 2, 2, 1, 1, 8, 8, 3, 5, 6, 7, 9  
I did it O(NlogN) time complexity.

1. Code : Convert little endian to big endian.  
   2. Code : Kth max in a file.  
   I did it using min-heap, then he sked me to use other data structure. Then I did it using Balanced binary search tree.  
   3. Code : Find the second non-repeating character in a string.  
   4. Given prime number p>=5 :  
   Prove that : (p^2 – 1) will be divisible by 24.  
   5. Given a decimal number N as a string of digits (only 0’s, 1’s and 2’s are there), how do I check if it’s divisible by 3 using regular expressions only, without converting to int? I was asked to design DFA for that.
2. Given a number you need to output the minimum number of factors needed to represent that number such that none of the factors is divisible by a perfect square.
3. EX-
4. INPUT – 8
5. So number of factors of 8 (2\*2\*2 , 4\*2 , 8) (NOTE : do not consider 1 because it is divisible by all numbers) So minimum factor will be 1 (8) but it is divisible by 4 so not allowed then minimum is 2(4 \* 2) but again 4 is divisible by 4 so not allowed so finally answer is 3 (2\*2\*2)
6. There are a number of houses in a row and each house contain some amount of money in it. Now suppose you’re a thief and you want to steal money from this houses so find the maximum money you can steal. Condition was that no two adjacent houses can be robbed.  
   After doing this he asked me to also print the houses that were robbed
7. Given an expression consisting of opening and closing parentheses you need to find the number of onions present in it.  
   Onion is any structure of the form ()

() – onion of size 1

(()) – onion of size 2

((())) – onion of size 3

So suppose if input is (()()) so output will be 2 because there are only two onions present in it

1. Given an n–ary tree .Print the right view of the tree.  
   After that he added to print the right view in a zigzag way like first element from top element , second from bottom third from top fourth from bottom and so on. Then asked to print both the left and right view of the tree
2. Given an array of 0’s and 1’s print the numbers in the form of Fibonacci sequence i.e. 1st 1 zero then 1 one then 2 zero then 3 one and so on  
   Ex –

INPUT – 00101111011101011000

OUTPUT – 01001110000011111110 (Number of 0’s and 1’s in the input and output must be same so if you run out of any of them then just simple print the remaining number)

1. Find the 2nd maximum number from a table using SQL query
2. Given a regular expression, and a string, validate the string against the regular expression  
   e.x.  
   Regular expression : ab\*bbc\*c  
   Pattern : abbbc VALID  
   Pattern : abc NOT VALID

Box stacking problem for k dimensions

1. Explain how chat-messenger functions in Facebook,Whatssap
2. Given a binary tree as below
3. A
4. / \
5. B C
6. / \
7. D E
8. / / \
9. F G H
10. Convert the structure of the tree like a left aligned tree whose each node contains a down pointer and a right pointer and looks like the below tree..
11. A
12. |
13. B – C
14. |
15. D—E
16. |
17. F—G – H
18. The arrival and departure time of trains are given. Find the minimum number of platforms to accommodate all the trains.
19. Eg. Arrival Departure
20. 7 11
21. 8 10
22. 13 14
23. 4 6
24. Output: 2

You are given a graph. Write a function to remove all the cycles. Means after the function call the graph must be converted into a connected acyclic graph(tree).

What happens when u send an email to someone.  
3. What is socket ? What is port?  
4. Which protocol is secure for mail transfer? Which protocol is used by Gmail?  
5. What is the port number of SMTP?  
6. Suppose u open notepad and type something and save it what would happen.  
7. What is static member?  
8. What is singleton class??  
9. If a class has all its members as static would it be a singleton class? Compare them.  
10. What is process scheduling? How does it happen? What are various queues maintained by the system? (Where does the scheduler process run ??- This ques was asked in 2nd round of DE Shaw & co).  
11. Suppose various process are waiting for a particular resource? What is this situation called? How does the system overcome from this problem?  
12. What the various ways of process communication?  
13. What is thrashing ?How to overcome from it?

Inorder predecessor and successor for a given key in BST

Given an array of heights of poles. Find the no of poles which are visible if you are standing at the ith pole.  
2) You have a you tube video. A person watches the video in random order. You have given the start and end time of various intervals he watched. How will you confirm whether he has watched the full video or not.

## Euler Circuit in a Directed Graph

You are given a string that represent an expression of digits and operands. Eg. 1+2\*3 , 1-2+4. You need to evaluate the string or the expression. NO BODMAS is followed. If the expression is of incorrect syntax return -1.  
Test cases :  
a) 1+2\*3 will be evaluated to 9.  
b) 4-2+6\*3 will be evaluated to 24.  
c) 1++2 will be evaluated to -1(INVALID).  
Also, in the string spaces can occur. For that case we need to ignore the spaces. Like :- 1\*2 -1 is equals to 1.

## Check if two nodes are cousins in a Binary Tree

Given the binary Tree and the two nodes say ‘a’ and ‘b’, determine whether the two nodes are cousins of each other or not.

Two nodes are cousins of each other if they are at same level and have different parents.

Example

6

/ \

3 5

/ \ / \

7 8 1 3

Say two node be 7 and 1, result is TRUE.

Say two nodes are 3 and 5, result is FALSE.

Say two nodes are 7 and 5, result is FALSE.

## Search in an almost sorted array

## Count all possible walks from a source to a destination with exactly k edges

<http://www.geeksforgeeks.org/problem-binary-search-implementations/>

<http://www.geeksforgeeks.org/count-ways-reach-nth-stair/>