Questions

1) **Write a program to find the closet element to a particular value in Binary Search Tree**

   https://www.geeksforgeeks.org/find-closest-element-binary-search-tree/

2) **What is the runtime complexity of your algorithm? How to determine run-time complexity of an algorithm.**

   the time complexity is the computational complexity that describes the amount of time it takes to run an algorithm

3) **Given two unsorted sets of integers, find the complement of the intersection of the two sets. What is the best-case runtime complexity of solving this problem?**

   https://www.geeksforgeeks.org/find-union-and-intersection-of-two-unsorted-arrays/

4) **How to implement Stack. Please provide arraylist implementation.**

Implementing a stack as an array list:

```
import java.util.ArrayList;
import java.util.EmptyStackException;

public class Stack {

   private ArrayList stack = new ArrayList();

   public void push(Object obj) {
         // Add obj to the stack.
      stack.add(obj);
   }

   public Object pop() {
         // Return and remove the top item from
         // the stack.  Throws an EmptyStackException
         // if there are no elements on the stack.
      if (stack.isEmpty())
         throw new EmptyStackException();
      return stack.remove(stack.size()-1);
   }

   public boolean isEmpty() {
         // Test whether the stack is empty.
      return stack.isEmpty();
   }

} // end class Stack
```

Implementing a queue as a linked list:

```
import java.util.LinkedList;

public class Queue {

   private LinkedList queue = new LinkedList();

   public void enqueue(Object obj) {
        // Add an item to back of queue.
      queue.addLast(obj);
   }

   public Object dequeue() {
        // Remove the next item from the front of the queue.
        // (Note that queue.removeFirst() both removes an
        // item from the list, and returns the item that
        // was removed.)  Throws a NoSuchElementException
        // if there are no items on the queue.
      return queue.removeFirst();
   }

   public boolean isEmpty() {
        // Test if the queue is empty.
      return queue.isEmpty();
   }

} // end class Queue
```

5) Write a program to find duplicate elements in an array.

```
public class Solution {
    // DO NOT MODIFY THE LIST
    public int repeatedNumber(final List<Integer> A) {
        if(A.size() ==0)
          return -1;
        int length = A.size();
        int[] check = new int[length+2];
        for(int e:A)
           {
           check[e]++;
           if(check[e]>1)
             return e;
           }
        return -1;
    }
}
```

6) Which web services is more Secured? When(in which type of applications) should you use SOAP and when should you use REST services?

SOAP is more secured than REST.

Security is never mentioned when discussing the benefits of REST over SOAP. Two simples security is provided on the HTTP protocol layer such as basic authentication and communication encryption through TLS. SOAP security is well standardized through WS-SECURITY. HTTP is not secured, as seen in the news all the time, therefore web services relying on the protocol needs to implement their own rigorous security. Security goes beyond simple authentication and confidentiality, and also includes authorization and integrity. When it comes to ease of implementation, I believe that SOAP is that at the forefront.

WS-Security offers confidentiality and integrity protection from the creation of the message to it's consumption. So instead of ensuring that the content of the communications can only be read by the right server it ensures that it can only be read by the right process on the server. Instead of assuming that all the communications in the securely initiated session are from the authenticated user each one has to be signed.

If the front end uses JSON, we choose REST. If its XML, we use SOAP.

For machine-to-machine communications such as business processing with BPEL, transaction security and integrity, I suggest using SOAP. SOAP binding to HTTP is possible and XML parsing is not noticeably slower than JSON on the browser. For building public facing API, REST is not the undisputed champion. Consider the actual application requirements and evaluate the benefits. People would say that REST protocol agnostic and work on anything that has URI is beside the point. According to its creator, REST was conceived for the evolution of the web. Most so-called RESTFul web services available on the internet are more truly REST-like as they do not follow the principle of the architectural style. One good thing about working with REST is that application do not need a service contract a la SOAP (WSDL). WADL was never standardized and I do not believe that developers would implement it. I remember looking for Twitter WADL to integrate it.

7) What is JAX-WS? What is JAXB? Can we send soap messages with attachments? What is WSDL? What does SOAP encodingStyle attribute defines? What are 2 styles web service's endpoint by using JAX-WS?

The **Java API** for XML Web Services (**JAX-WS**) is a **Java** programming language **API** for creating web services, particularly SOAP services. **JAX-WS** is one of the **Java** XML programming **APIs**. It is part of the **Java** EE platform.

XML and Java technology are recognized as ideal building blocks for developing Web services and applications that access Web services. A new Java API called Java Architecture for XML Binding (JAXB) can make it easier to access XML documents from applications written in the Java programming language.

Yes, we can send attachments with soap messages.

What is a WSDL used for?

A **WSDL** is an XML document that describes a web service. It actually stands for Web Services Description Language. SOAP is an XML-based protocol that lets you exchange info over a particular protocol (can be HTTP or SMTP, for example) between applications. Sep 22, 2010

8) What is a resource in a REST? What are frameworks available to implement REST web services? What is the Jersey framework? What tool are required to test REST services? What does a @Path annotation do? What does a @QueryParam do? What does a @PathParam do?

9) How to get HTTP request header in JAX-RS (2 ways)? How to download file in JAX-RS?

10) If any intermediary proxy is not used to server any response to client's request, is there any difference between private and public directives of Cache-Control?

11) Can you write-down an example of MatrixParam expression?

12) What is security in rest? How do you implement that?

13) For using JAXB supported XML to Custom-object and Custom-object to XML mapping/conversion, along with RESTful service, what are the annotations those can be used along with custom object?

14) Design a rest api framework for messaging application.

15) Have you used Maven to generate Jersey based RESTful services? if yes, how?

16) What is spring? Sprint Bean type? Spring auto-wiring and type of auto-wiring?

17) What is hibernate transient and detached object? What is hibernate lazy loading

18) How do you define Web Services? Rest Vs. SOAP

19) What are the main features of Restful API? Why Rest Web Services are very popular? HOw experienced you are in REST API? Do you know SOAP WEb services?

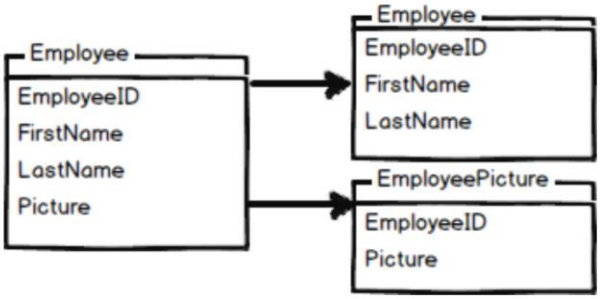
20) For an example, if the requirement is to retrieve all the books in a library and the result would be in XML format, how would you write a code for this in simplest form, or just write the Java class that does this mapping ?

21) What is database partitioning? How to create indexes, triggers and schema in database

Partitioning is the database process where very large tables are divided into multiple smaller parts. By splitting a large table into smaller, individual tables, queries that access only a fraction of the data can run faster because there is less data to scan. The main of goal of partitioning is to aid in maintenance of large tables and to reduce the overall response time to read and load data for particular SQL operations.

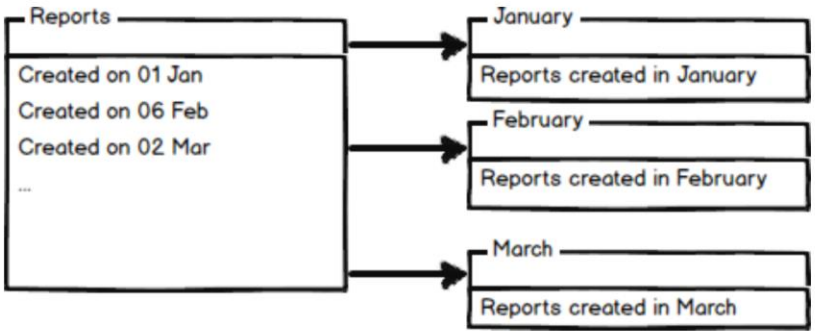
Vertical Partitioning on SQL Server tables

Vertical table partitioning is mostly used to increase SQL Server performance especially in cases where a query retrieves all columns from a table that contains a number of very wide text or BLOB columns. In this case to reduce access times the BLOB columns can be split to its own table. Another example is to restrict access to sensitive data e.g. passwords, salary information etc. Vertical partitioning splits a table into two or more tables containing different columns:



Horizontal Partitioning on SQL Server tables

Horizontal partitioning divides a table into multiple tables that contain the same number of columns, but fewer rows. For example, if a table contains a large number of rows that represent monthly reports it could be partitioned horizontally into tables by years, with each table representing all monthly reports for a specific year. This way queries requiring data for a specific year will only reference the appropriate table. Tables should be partitioned in a way that queries reference as few tables as possible.



22) You have an array (2,3,10,0,-4,9,8,-5,6,7,0,8,0,5,-7,6,4,-7,8,3,2,0,5,8). Write a program which sequence will give you the highest sum.

```java
public class Solution {
    // DO NOT MODIFY THE LIST. IT IS READ ONLY
    public int maxSubArray(final List<Integer> A) {
        int max_sum_sofar = A.get(0);
        int current_max = A.get(0);
        for(int i=1;i<A.size();i++)
        {
            current_max = Math.max(A.get(i),current_max+A.get(i));
            max_sum_sofar = Math.max(max_sum_sofar,current_max);
        }
        return max_sum_sofar;
    }
}
```

23) You have an array with elements 23, 12, 27, 15, 18, 7, 9, 10. Write a program to check which two elements' addition would fetch you 32.

Interviewer expect that candidate should first ask whether an array is sorted or not.

According to interviewer answer yes or no. If no, then first tell them first I would sort that array in the program and then I would which two digits sum will give me the required number.

```java
public class Solution {
    public ArrayList<Integer> twoSum(final List<Integer> a, int b) {

        HashMap<Integer, Integer> map = new HashMap<Integer, Integer>();

        ArrayList<Integer> ans = new ArrayList<Integer>();

        for (int i = 0; i < a.size(); i++)
        {
            int curr = a.get(i);
            if (map.containsKey(b-curr))
            {
                int index = map.get(b-curr);
                ans.add(index);
                ans.add(i + 1);
                return ans;
            }
            else if (!map.containsKey(curr))
            {
                map.put(curr, i + 1);
            }
        }

        return ans;
    }
}
```

24) Implemenet isNumber function and write test case for that. You are not allowed to use any inbuild Java Method for example you can not use Integer.parseInt. You are allowed to use inbuild method to convert string to char array however.

25) Write a program to check if linked list is looped or not

```java
public class Solution {
    public ListNode detectCycle(ListNode head) {
        ListNode slow = head;
                ListNode fast = head;

                while (fast!=null && fast.next!=null){
                    fast = fast.next.next;
                    slow = slow.next;

                    if (fast == slow){
                        ListNode slow2 = head;
                        while (slow2 != slow){
                            slow = slow.next;
                            slow2 = slow2.next;
                        }
                        return slow;
                    }
                }
                return null;
    }
}
```

26) Write a program to sort all the elements in array in descending order with sorting algorithm. Which sorting algorithm is fastest and why?

27) Write a program to separate the numeric characters from alphanumeric string.(Candidate should use Regular expression)

28) Write code to implement your own hashmap in your own version

29) Write a program to check whether string is palindrome or not.

30) Difference between final, finally and finalize.

No.	final	finally	finalize
1)	Final is used to apply restrictions on class, method and variable. Final class can't be inherited, final method can't be overridden and final variable value can't be changed.	Finally is used to place important code, it will be executed whether exception is handled or not.	Finalize is used to perform clean up processing just before object is garbage collected.
2)	Final is a keyword.	Finally is a block.	Finalize is a method.

31) What all different frameworks you have used? Which version of Spring and Hibernate frameworks you are using? If candidates are using verison higher than 3.x or 4.x..thats better. Good Candidate should specify exact version than 3.x or 4.x.

32) Given two sorted lists of integers, write a function to merge them.

33) How good you are at debugging? Diff b/w run-time and complie-time error.

A run time error will only occur when the code is actually running. These are the most difficult - and lead to program crashes and bugs in your code which can be hard to track down.

An example might be trying to convert a string: "hello" into an integer:

```
string helloWorld = "hello";
int willThrowRuntimeError = Convert.ToInt32(helloWorld);
```

The compiler may not see this as a problem but when run an error will be thrown.

Compiler errors are due to inaccuracies in code, where the compiler throws an error to alert you to something which will not compile, and therefore cannot be run.

An example of a compiler error would be:

```
int = "this is not an int";
```

Hope that helps.

34) Write a program to generate 15 random integers between 0 and 10.(Candidate should use reverse function)

35) Explain All Sorting and searching Algorithms

36) Write sql query to get the items in the ascending order of their purchase date and grouped by the category (clothing, grocery and cosmetics).

37) Basic functions in sql queries.

- SQL COUNT Function - The SQL COUNT aggregate function is used to count the number of rows in a database table.
- SQL MAX Function - The SQL MAX aggregate function allows us to select the highest (maximum) value for a certain column.
- SQL MIN Function - The SQL MIN aggregate function allows us to select the lowest (minimum) value for a certain column.
- SQL AVG Function - The SQL AVG aggregate function selects the average value for certain table column.
- SQL SUM Function - The SQL SUM aggregate function allows selecting the total for a numeric column.
- SQL SQRT Functions - This is used to generate a square root of a given number.
- SQL RAND Function - This is used to generate a random number using SQL command.
- SQL CONCAT Function - This is used to concatenate any string inside any SQL command.
- SQL Numeric Functions - Complete list of SQL functions required to manipulate numbers in SQL.
- SQL String Functions - Complete list of SQL functions required to manipulate strings in SQL.

https://www.tutorialspoint.com/sql/sql-useful-functions.htm

38) What are prepared statements and callable statements.

Statement	PreparedStatement	CallableStatement
It is used to execute normal SQL queries.	It is used to execute parameterized or dynamic SQL queries.	It is used to call the stored procedures.
It is preferred when a particular SQL query is to be executed only once.	It is preferred when a particular query is to be executed multiple times.	It is preferred when the stored procedures are to be executed.
You cannot pass the parameters to SQL query using this interface.	You can pass the parameters to SQL query at run time using this interface.	You can pass 3 types of parameters using this interface. They are – IN, OUT and IN OUT.
This interface is mainly used for DDL statements like CREATE, ALTER, DROP etc.	It is used for any kind of SQL queries which are to be executed multiple times.	It is used to execute stored procedures and functions.
The performance of this interface is very low.	The performance of this interface is better than the Statement interface (when used for multiple execution of same query).	The performance of this interface is high.

39) What is the difference between function and procedure

A function returns a value and a procedure just executes commands.

The name function comes from math. It is used to calculate a value based on input.

A procedure is a set of command which can be executed in order.

In most programming languages, even functions can have a set of commands. Hence the difference is only in the returning a value part.

But if you like to keep a function clean, (just look at functional languages), you need to make sure a function does not have a side effect.

40) Write a java program to count number of unique words separated by comma (,) and their occurrence from text file.
41) How to override equals method
42) How to implement and override hashcode
43) Difference between == and .equals() method. Why spring is immutable. Diff bw stringbuffer and stringbuilder
44) How to do hibernate mapping? What all information is present in hibernate mapping files?
45) Explain all the configuration files in hibernate
46) What is session factory.
47) What is transaction management in jdbc and hibernate? How to do transaction management?
48) Write a java program for swapping of two numbers.
49) Given 2 Json objects how would you compare.
50) What is Fibonacci series. Please implement a function which returns the n^{th} number in Fibonacci sequences with an input n.
51) Write a function which would print Fibonacci numbers up to given maximum
52) What is MVC Framework? What are its benfits? How to write a simple MVC application.
53) What all methods implemented in REST? Explain all of them. Diff between put and post
54) Diff between AJAX and REST, SOAP and REST. How ajax is used with rest?
55) What is Json object? Format and how to use json?
56) IO File mapping.
57) Serializable interface

https://www.javatpoint.com/serialization-in-java

58) Write a Use case to show how to override in class

Animal class – Cat & dog needs to override sound method

59) Explain FileInput Stream and File Output steam

60) Write a program to reverse a String in Java.

```
public class Solution {
    public String reverseWords(String a) {
        Scanner parts = new Scanner(a);
        String result = "";
        while(parts.hasNext())
        {
            result = parts.next()+ " " + result;
        }
        return result.trim();
    }
}
```

```
public boolean isPalindrome(String text) {
    String clean = text.replaceAll("\\s+", "").toLowerCase();
    int length = clean.length();
    int forward = 0;
    int backward = length - 1;
    while (backward > forward) {
        char forwardChar = clean.charAt(forward++);
        char backwardChar = clean.charAt(backward--);
        if (forwardChar != backwardChar)
            return false;
    }
    return true;
}
```

61) Write a program to fetch unique elements from Array.

```
// This function prints all distinct elements
static void printDistinct(int arr[])
{
    // Creates an empty hashset
    HashSet<Integer> set = new HashSet<>();

    // Traverse the input array
    for (int i=0; i<arr.length; i++)
    {
        // If not present, then put it in hashtable and print it
        if (!set.contains(arr[i]))
        {
            set.add(arr[i]);
            System.out.print(arr[i] + " ");
        }
    }
}
```

62) Write a program to reverse a number

```java
import java.util.Scanner;
class ReverseNumberWhile
{
   public static void main(String args[])
   {
      int num=0;
      int reversenum =0;
      System.out.println("Input your number and press enter: ");
      //This statement will capture the user input
      Scanner in = new Scanner(System.in);
      //Captured input would be stored in number num
      num = in.nextInt();
      //While Loop: Logic to find out the reverse number
      while( num != 0 )
      {
          reversenum = reversenum * 10;
          reversenum = reversenum + num%10;
          num = num/10;
      }

      System.out.println("Reverse of input number is: "+reversenum);
   }
}
```

63) Describe a difficult project you had. If you wrote tests for it, describe the tests. If you didn't write tests for it, looking back, what were the contact points at which you would write tests?
64) Basic coding (Java): Implement an abstract class in Java.
65) Follow-up: What is necessary for you to do when implementing an abstract class?
66) Create a function that finds the sum of all the integers in a string ("abc1xy2mno78jh3khl21"). Continuous integers are considered one number.
67) Write a Program to search a word in pdf.
68) Write a program to program print prime numbers
69) How to pass parameters from testng.xml into test case.
70) Differences between Soap vs. Rest.
71) What is JDBC template? How to do spring JDBC configuration?
72) How to create a DB connection, explain the steps to query a database.
73) Write a program to implement ArrayList
74) Do we need to implement any method of Serializable interface to make an object serializable?
75) What are the main features of Restful API? Why Rest Web Services are very popular? HOw experienced you are in REST API? Do you know SOAP WEb services? Difference between Rest & SOAP Web Services?
76) Which web services is more Secured? When(in which type of applications) should you use SOAP and when should you use REST services? Why SOAP services are more secured and why they are used in financial domain?
77) How can you make Rest service more secured? Difference between PUT and POST.
78) What is JSON object and explain its syntax? How it is used in REST webservices?
79) How do you implement your own hashmap? How to iterate over map? difference between set and map.
80) Write program to check if linked list is looped or not.

```java
public class Solution {
    public ListNode detectCycle(ListNode head) {
        ListNode slow = head;
                ListNode fast = head;

                while (fast!=null && fast.next!=null){
                    fast = fast.next.next;
                    slow = slow.next;

                    if (fast == slow){
                        ListNode slow2 = head;
                        while (slow2 != slow){
                            slow = slow.next;
                            slow2 = slow2.next;
                        }
                        return slow;
                    }
                }
                return null;
    }
}
```

81) write program to find the third element from start in doubly linked list

82) How to validate a string using JSON?

83) How to reverse a string using recursion?

84) Write a program to check for number for 1 to 100,
print "Fizz" if number is divisible by 3, print "Buzz" if number is divisible by 5
print "FizzBuzz if number is divisible by both else print the number

85) Write a program to match the parenthesis () and return results
()() - true
((())) - true
)(- false
((()) - false
()()) - false
())(- false

```java
public class Solution {
    public int isValid(String A) {
        Stack<Character> result = new Stack<Character>();
        for(char c : A.toCharArray())
        {
            if(c == '(')
              result.push(')');
            else if (c == '[')
              result.push(']');
            else if (c == '{')
              result.push('}');
            else if(result.isEmpty() || result.pop()!= c)
              return 0;
        }
        if(!result.isEmpty())
           return 0;
        return 1;
    }
}
```

86) Validate a JSON string(without using any library)

Just by parsing it, using `JSON.parse` function:

```javascript
function isValidJSON(text){
    try{
        JSON.parse(text);
        return true;
    }
    catch (error){
        return false;
    }
}
```

87) How to implement your own version of linked list.
https://gist.github.com/es20641/1208340/06d598126d53b048058bc243cbc4e4dd7db9a23a

88) Write a program to Swap the two numbers without using third variable

```java
import java.*;

public class GFG {

    public static void main(String a[]){
        int x = 10;
        int y = 5;

        // Code to swap 'x' (1010) and 'y' (0101)
        x = x ^ y; // x now becomes 15 (1111)
        y = x ^ y; // y becomes 10 (1010)
        x = x ^ y; // x becomes 5 (0101)

        System.out.println("After swap: x = "
                           + x + ", y = " + y);
    }
}
```

89) Write a program to check if string is palindrome

```java
// Java program to illustrate checking of a string
// if its palindrome or not using reverse function
class Palindrome
{
  public static void checkPalindrome(String s)
  {
    // reverse the given String
    String reverse = new StringBuffer(s).reverse().toString();

    // check whether the string is palindrome or not
    if (s.equals(reverse))
      System.out.println("Yes");

    else
      System.out.println("No");
  }

  public static void main (String[] args)
              throws java.lang.Exception
  {
    checkPalindrome("malayalam");
    checkPalindrome("GeeksforGeeks");
  }
}
```

```java
public class PalindromeChecker {

public static boolean isPalindrome(String str){

   StringBuilder sb=new StringBuilder(str);

   sb.reverse();

   String rev=sb.toString();

   if(str.equals(rev)){

      return true;

   }else{

      return false;

   }

}

}
```

90) Write a program for String abbreviation by replacing all the characters in between the first and last character by the number count of characters in between like hello should be h3o(replace ell 3 characters by 3), internationalization as i18n.

91) Difference between Rest & SOAP Web Services?

https://www.guru99.com/comparison-between-web-services.html

92) design vending machine

https://javarevisited.blogspot.com/2016/06/design-vending-machine-in-java.html

93) reverse a number

```java
import java.util.Scanner;
class ReverseNumberWhile
{
   public static void main(String args[])
   {
      int num=0;
      int reversenum =0;
      System.out.println("Input your number and press enter: ");
      //This statement will capture the user input
      Scanner in = new Scanner(System.in);
      //Captured input would be stored in number num
      num = in.nextInt();
      //While Loop: Logic to find out the reverse number
      while( num != 0 )
      {
          reversenum = reversenum * 10;
          reversenum = reversenum + num%10;
          num = num/10;
      }

      System.out.println("Reverse of input number is: "+reversenum);
   }
}
```

94) merge 2 sorted array

```java
class MergeTwoSorted
{
    // Merge arr1[0..n1-1] and arr2[0..n2-1]
    // into arr3[0..n1+n2-1]
    public static void mergeArrays(int[] arr1, int[] arr2, int n1,
                                   int n2, int[] arr3)
    {
        int i = 0, j = 0, k = 0;

        // Traverse both array
        while (i<n1 && j <n2)
        {
            // Check if current element of first
            // array is smaller than current element
            // of second array. If yes, store first
            // array element and increment first array
            // index. Otherwise do same with second array
            if (arr1[i] < arr2[j])
                arr3[k++] = arr1[i++];
            else
                arr3[k++] = arr2[j++];
        }

        // Store remaining elements of first array
        while (i < n1)
            arr3[k++] = arr1[i++];

        // Store remaining elements of second array
        while (j < n2)
            arr3[k++] = arr2[j++];
    }
```

95) Difference between rest/soap, usage of both when to use what?

https://www.guru99.com/comparison-between-web-services.html

96) distributed transaction

Usually, transactions occur on one database server:

```
BEGIN TRANSACTION
SELECT something FROM myTable
UPDATE something IN myTable
COMMIT
```

A *distributed transaction* involves multiple servers:

```
BEGIN TRANSACTION
UPDATE amount = amount - 100 IN bankAccounts WHERE accountNr = 1
UPDATE amount = amount + 100 IN someRemoteDatabaseAtSomeOtherBank.bankAccounts WHERE accountN
COMMIT
```

The difficulty comes from the fact that the servers must *communicate* to ensure that transactional properties such as *atomicity* are satisfied on both servers: If the transaction succeeds, the values must be updated on both servers. If the transaction fails, the transaction must be rollbacked on both servers. It must never happen that the values are updated on one server but not updated on the other.

A distributed transaction is a transaction that works across several computers. Say you start a transaction in some method in a program on computer A. You then make some changes to data in the method on computer A, and afterwords the method calls a web service on computer B. The web service method on computer B fails and rolls the transaction back. Since the transaction is distributed, this means that any changes made on computer A also need to be rolled back. The combination of the distributed transaction coordinator on windows and the .net framework facilitate this functionality.

97) database queries

98) explain high level architecture of your current application and related question

99) spring Orm, Dao questions

100) How you implement caching in your project.

101) Explain singleton design pattern.

102) Difference between rest and soap.

103) Implement Interger.parseint in Java.

A solution for this task can be found here. The source code for parsing a `String` to an `int` could look like:

```
public int ConvertStringToInt(String s) throws NumberFormatException
{
    int num =0;
    for(int i =0; i<s.length();i++)
    {
        if(((int)s.charAt(i)>=48)&&((int)s.charAt(i)<=57))
        {
            num = num*10+ ((int)s.charAt(i)-48);
        }
        else
        {
            throw new NumberFormatException();
        }

    }
    return num;
}
```

104) Write program to find number is power of 2 or not.
https://www.geeksforgeeks.org/program-to-find-whether-a-no-is-power-of-two/

105) Given a binary tree, write a method to print the tree level by level.

```
/* Function to line by line print level order traversal a tree*/
static void printLevelOrder(Node root)
{
    int h = height(root);
    int i;
    for (i=1; i<=h; i++)
    {
        printGivenLevel(root, i);
        System.out.println();
    }
}
/* Print nodes at a given level */
void printGivenLevel(Node root, int level)
{
    if (root == null)
        return;
    if (level == 1)
        System.out.println(root.data);
    else if (level > 1)
    {
        printGivenLevel(root.left, level-1);
        printGivenLevel(root.right, level-1);
    }
}
```

106) how to merge two sorted list in to one list

```java
class MergeTwoSorted
{
    // Merge arr1[0..n1-1] and arr2[0..n2-1]
    // into arr3[0..n1+n2-1]
    public static void mergeArrays(int[] arr1, int[] arr2, int n1,
                                   int n2, int[] arr3)
    {
        int i = 0, j = 0, k = 0;

        // Traverse both array
        while (i<n1 && j <n2)
        {
            // Check if current element of first
            // array is smaller than current element
            // of second array. If yes, store first
            // array element and increment first array
            // index. Otherwise do same with second array
            if (arr1[i] < arr2[j])
                arr3[k++] = arr1[i++];
            else
                arr3[k++] = arr2[j++];
        }

        // Store remaining elements of first array
        while (i < n1)
            arr3[k++] = arr1[i++];

        // Store remaining elements of second array
        while (j < n2)
            arr3[k++] = arr2[j++];
    }
```

how to find lca in binary tree

```java
// Recursive Java program to print lca of two nodes

// A binary tree node
class Node
{
    int data;
    Node left, right;

    Node(int item)
    {
        data = item;
        left = right = null;
    }
}

class BinaryTree
{
    Node root;

    /* Function to find LCA of n1 and n2. The function assumes that both
       n1 and n2 are present in BST */
    Node lca(Node node, int n1, int n2)
    {
        if (node == null)
            return null;

        // If both n1 and n2 are smaller than root, then LCA lies in left
        if (node.data > n1 && node.data > n2)
            return lca(node.left, n1, n2);

        // If both n1 and n2 are greater than root, then LCA lies in right
        if (node.data < n1 && node.data < n2)
            return lca(node.right, n1, n2);

        return node;
    }
```

```
    /* Driver program to test lca() */
    public static void main(String args[])
    {
        // Let us construct the BST shown in the above figure
        BinaryTree tree = new BinaryTree();
        tree.root = new Node(20);
        tree.root.left = new Node(8);
        tree.root.right = new Node(22);
        tree.root.left.left = new Node(4);
        tree.root.left.right = new Node(12);
        tree.root.left.right.left = new Node(10);
        tree.root.left.right.right = new Node(14);

        int n1 = 10, n2 = 14;
        Node t = tree.lca(tree.root, n1, n2);
        System.out.println("LCA of " + n1 + " and " + n2 + " is " + t.data);

        n1 = 14;
        n2 = 8;
        t = tree.lca(tree.root, n1, n2);
        System.out.println("LCA of " + n1 + " and " + n2 + " is " + t.data);

        n1 = 10;
        n2 = 22;
        t = tree.lca(tree.root, n1, n2);
        System.out.println("LCA of " + n1 + " and " + n2 + " is " + t.data);

    }
}

// This code has been contributed by Mayank Jaiswal
```

```java
public class Interview {
    public int processString(String s1)
    {
        int sum = 0;
        String temp = "";
        for(int i=0;i<s1.length();i++)
        {
            if(Character.isDigit(s1.charAt(i)))
                temp = temp + s1.charAt(i);
            else
                if(!temp.equals(""))
                {
                    sum = sum + Integer.parseInt(temp);
                    temp = "";
                }
        }
        if(!temp.equals(""))
                {
                    sum = sum + Integer.parseInt(temp);
                 }
        return sum;
    }
```

Given a stream of integers and a window size, calculate the moving average of all integers in the sliding window.

1. Merge two sorted Linkedlist.

```java
/**
 * Definition for singly-linked list.
 * class ListNode {
 *     public int val;
 *     public ListNode next;
 *     ListNode(int x) { val = x; next = null; }
 * }
 */
public class Solution {
    public ListNode mergeTwoLists(ListNode A, ListNode B) {
        ListNode p = A;
        ListNode q = B;
        char check;
        if(p ==null)
          return q;
        if(q == null)
          return p;
        ListNode s;
        if(p.val<=q.val)
        {
          s = p;
          p = p.next;
          check = 'p';
        }
        else
        {
          s = q;
          q=q.next;
          check = 'q';
        }
```

```
        else
        {
          s = q;
          q=q.next;
          check = 'q';
        }
        while(p!= null && q!=null)
        {
          if(p.val<=q.val)
          {
             s.next = p;
             s = s.next;
             p = p.next;
          }
          else if(q.val<p.val)
          {
              s.next = q;
              s = s.next;
              q = q.next;
          }

        }

        if(p!= null)
          s.next = p;
        else
          s.next = q;

        if(check == 'p')
          return A;

        return B;
    }
}
```

2. check whether the expression is in proper format

` ()()((()))(() `

1.Suppose we have a mapping relationship between numbers and characters: (Phone keyboard)

1 -> ABC

2 -> DEF

3 -> GHI

4 …

0 -> WXYZ

Given an int num: print all possible combinations of mapping

example : ’12’ can map to [AD, AE, AF, BD, BE, BF, CD, CE, CF]

2. implement merge sort

https://www.geeksforgeeks.org/merge-sort/

3. convert a sorted array to Binary Search tree

https://www.geeksforgeeks.org/sorted-array-to-balanced-bst/

4 Removed duplicate from link list. Also write the test cases(Using hashing)

https://www.geeksforgeeks.org/remove-duplicates-from-an-unsorted-linked-list/

5 Intersection of two linkedlist. find long string and then Questions on resume.

https://leetcode.com/problems/intersection-of-two-linked-lists/discuss/138261/Java-Solution

6. find the height of binary trees.

https://www.geeksforgeeks.org/write-a-c-program-to-find-the-maximum-depth-or-height-of-a-tree/

7 questions on Trees like find length, height & width of binary tree

https://www.geeksforgeeks.org/maximum-width-of-a-binary-tree/

https://www.geeksforgeeks.org/write-a-c-program-to-find-the-maximum-depth-or-height-of-a-tree/

8 merge 2 sorted arrays, Find subset of array equal to sum.

9 Sort a stack

https://www.geeksforgeeks.org/sort-stack-using-temporary-stack/

10 a mapping relationship between numbers and characters, In a linked list find nth node from end of linkedlist

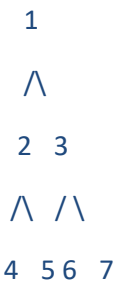
LRU, design questions,

1: sorting array, all kinds of methods

2: give a string list, return K most frequent values, follow up test cases

https://www.geeksforgeeks.org/find-the-k-most-frequent-words-from-a-file/

3. give a string, remove start and end one time, until the string is empty or only 1 char;



find weight of all elements such that weight =sumof(product of all the traversal path throguh node)

for ex consider 2

find all path traversing through 2

{1,2,4} and {1,2,5}

now weight of 2 is

(1*2*4) +(!*2*5)

8+10

18

==========

Given a singly linked list, write a function to swap elements pairwise. For example, if the linked list is 1->2->3->4->5 then the function should change it to 2->1->4->3->5, and if the linked list is 1->2->3->4->5->6 then the function should change it to 2->1->4->3->6->5.

2.. Expression Evaluation Given a String find the result of the expression (2+(3-4)*2+(4-3)*2)

3. Given a String and lists of string, construct a list with true or false, if the lists of strings is a subsequence of an actual string.

4. Find all the values less than the number in an array and the index must be greater than the current elements index.

5. Given an array of all zeros and lists of tuples containing (left index, right index, value) and a list of value and an index we need to return the value at index.

Ex: Array: [0 ,0 ,0,0,0,0,0,0,0,0,0,0,0,0,0,0,0,00,0,0,0,0,0] and list of tuples [[1,3, 4], [2, 4, 6],.....] and list of indices [2, 4, 6, 1] the actual result array is

[0, 4, 10, 10, 6, ...]

6. Combination sum

7. LRU cache

https://leetcode.com/problems/lru-cache/discuss/138835/Beats-95-hashmap-with-linklist

https://www.geeksforgeeks.org/lru-cache-implementation/

8. Shortest path from the root node of a matrix and the bottom right node in an matrix. The matrix is Binary matrix and you can only traverse through 1's.

9.How to to implement a queue using two stacks

10. How to implement a stack using single queue

11.Convert a given Binary Tree to Doubly Linked List

12.Given an array of integers, return indices of the two numbers such that they add up to a specific target.

You may assume that each input would have exactly one solution, and you may not use the same element twice.

Example:

Given nums = [2, 7, 11, 15], target = 9,

Because nums[0] + nums[1] = 2 + 7 = 9,

return [0, 1].

13.Balanced parenthesis

1()() -->

2.)(---false

3.(((())---true

4.((((()))

14.Implement a circular integer queue using array to provide the following methods:

int size()

boolean isEmpty()

boolean isFull()

void enqueue(int val)

int dequeue()

Question 15:public interface PointsOnAPlane {

```
/**
* Stores a given point in an internal data structure
*/
void addPoint(Point point);

/**
* For given 'center' point returns a subset of 'm' stored points that are
* closer to the center than others.
*
* E.g. Stored: (0, 1) (0, 2) (0, 3) (0, 4) (0, 5)
*
* findNearest(new Point(0, 0), 3) -> (0, 1), (0, 2), (0, 3)
*/
Collection<Point> findNearest(Point center, int m);

}
```

Question 16:Given two strings s and t, determine if they are isomorphic. Two strings are isomorphic if the characters in s can be replaced to get t.

For example,"egg" and "add" are isomorphic, "foo" and "bar" are not.

Question17:

The kth smallest in a unsorted array

Question18:Given an array and a number k where k is smaller than size of array, we need to find the k'th smallest element in the given array. It is given that ll array elements are distinct.

For ex: Input: arr[] = {7, 10, 4, 3, 20, 15}

k = 3

Question 19:

Find distance between two given keys of a Binary Tree

Question10: given a array of string followed by two words. You have to find the minimum distance between the two words in the given array of string. For example:

(“the”, “quick”, “brown”, “fox”, “quick”)

distance(“fox”,”the”) == 3

distance(“quick”, “fox”) == 1

Queston:20

Given two sorted array of Strings, Implement a merged sorted array of string

==========

21. * Implement a stack which besides, the usual push, pop and top, has an extra operation.

* It returns the middle element of the stack in constant time.

* Example:

* Stack State GetMiddle()

* ==========

* Push(1) (1) 1

* Push(2) (2,1) 2

* Push(3) (3,2,1) 2

* Push(4) (4,3,2,1) 3

* Push(5) (5,4,3,2,1) 3

* Pop() (4,3,2,1) 3

* Pop() (3,2,1) 2

* Pop() (2,1) 2

* Pop() (1) 1

* Pop() null null

22. Description: Given a binary tree, write a method to print the tree level by level.

(e.g)

Tree:

```
    1
   / \
  3   5
 / \   \
2   4   7
```

/ \ \

9 6 8

==========

Expected Output:

1

35

247

968

23.diameter of binary tree

24.write code for when a deadlock can occur how to prevent it

25.find the height of a binary tree

26.How to merge twos sorted array

27.implement merge sort

28.Suppose we have a mapping relationship between numbers and characters: (Phone keyboard)

1 -> ABC

2 -> DEF

3 -> GHI

4 …

0 -> WXYZ

Given an int num: print all possible combinations of mapping

example : ’12’ can map to [AD, AE, AF, BD, BE, BF, CD, CE, CF]

29.Given a 2-d grid map of '1's (land) and '0's (water), count the number of islands. An island is surrounded by water and is formed by connecting adjacent lands horizontally or vertically. You may assume all four edges of the grid are all surrounded by water.

Example 1:

11110

11010

11000

00000

30.Describe concurrent hash map how it works internally

31.You are provided with library and its dependent libraries .

eBayApps -> eBayPayApps, JShared

JWGroup -> TxnGroup, JShared

JShared -> ebaySharedApps

ebaySharedApps -> SEShared, Core

eBayPayApps -> ebaySharedApps, ALib

TxnGroup -> ebaySharedApps, WLib

Output : Return the list of app dependencies such that 1st level dependencies are in top of the list followed by 2nd level dependencies. and third level dependencies .

eBayApps -- > eBayPayApps, JShared,ebaySharedApps, ALib, SEShared, Core

32.Given a sorted dictionary of an alien language, find order of characters

Input: words[] = {"baa", "abcd", "abca", "cab", "cad"}

Output: Order of characters is 'b', 'd', 'a', 'c'

Note that words are sorted and in the given language "baa"

comes before "abcd", therefore 'b' is before 'a' in output.

Similarly we can find other orders.

Input: words[] = {"caa", "aaa", "aab"}

Output: Order of characters is 'c', 'a', 'b'

find the insertion point in a sorted array

```
public int searchInsert(int[] A, int target) {
    int low = 0, high = A.length-1;
    while(low<=high){
        int mid = (low+high)/2;
        if(A[mid] == target) return mid;
        else if(A[mid] > target) high = mid-1;
        else low = mid+1;
    }
    return low;
}
```

find common elements in 3 elements
find all triplets in array which has the target sum

https://www.geeksforgeeks.org/unique-triplets-sum-given-value/

find a string's length without using string.length()(use exceptions)

- `str.toCharArray().length` should work.
- Or how about:

  `str.lastIndexOf("")`

  Probably even runs in constant time :)
- Another one

```
Matcher m = Pattern.compile("$").matcher(str);
m.find();
int length = m.end();
```

- One of the dumbest solutions: `str.split("").length - 1`
- Is this cheating: `new StringBuilder(str).length()` ? :-)

streaming flow of integers, how to get median as quick as possible
given a input string, return a list of string that starts with the input(use prefix tree)
given a matrix, each cell with a color, and a point (x, y), find perimeter of the area which start from the point