Pre-notes:

- This document contains questions and some answers from Interviews that started in December 2016 to this date. Power Batch would like to take a little credit of assembling and maintaining this document.
- The questions in this questionnaire have been compiled from interviews at various firms, firms that are not even listed in this document.
- Answers in this questionnaire are very summarized and are not perfect, so it is extremely suggested that you focus on digging out answers yourself from the internet.
- What counts the most during interviews aside from the technical aspect that this document is aimed to guide you, are the following things:
    - The way you dress for the interview, make sure you look decent and well presented.
    - The way you enter the interview hall or room. Dont be hesitant or shy, dont trip but also dont be too rushy, wait for the instructions from the person who is receiving you. Your body should be calm and words should not slip from your mouth. Dont say anything unless someone speaks to you themselves. Make sure to greet your interviewers and ask them their health out of courtesy.
    - The way you sit and how your hand moves during the interview counts a lot. Sit calmly on your seat, excessive movement of hands show that you re not calm. Dont move your legs too much, in short be very calm. Remember that in most cases, moving your hands while answering i.e. syncing your answer with gestures from hands too much, is not considered good. Keep the hand gestures while answering to the minimum (not zero though otherwise you will look like a mannequin)
    - The way you talk. Dont rush answering the questions, let the interviewer complete what he/she says first. Make sure your vocals are not very loud neither very low. Answer to the point and if possible mention something new in the answer that you already know well, this shall make good ground for you for the next question to come because the interviewer usually asks questions from what you answer.
    - Your confidence. Be very confident, the interviewer is there to assess you for just a job not for your life. Dont fear rejection, dont let them hold you back by making you think you re helpless. You are not! If you need a job, they also need individuals to run their firm. The need goes both ways.
- Dont skip the general questions listed in this document. Make sure you have prepared 3 to 4 sets of answers for all those questions after discussing them with people from the industry. How you answer those questions is your first impression on the interviewer.
- Dont disclose your true future plans to the interviewer, always give them the answer that THEY WANT about your future.

Links and Sources to trust:

- The best source for .NET framework technologies is https://msdn.microsoft.com/en-us/.
- https://www.w3schools.com/ , https://www.**codeproject**.com/ and https://www.**tutorials**point.com are other very good sources online to learn various technologies.
- To understand the depth of OOP and Data Structures make sure you code each and everything yourself and test what works and what doesn't. Specially polymorphism, abstract classes and linked lists. [This is coming from personal experiences of the people who have been through this phase and realized later]

Disclaimer:

- This document is not the "ultimate" guide for your interview preparation, but these topics would definitely cover up roughly 70-80% of the questions asked in technology interviews.
- Make sure you search the internet well before your interview with the keywords like "Top questions asked in java interview", "Top questions asked in SQL or database interview" or "Top questions asked in .NET interview"
- It is highly recommended to thoroughly revise the courses "Object Oriented Programming", "Data Structures", "Fundamentals of Operating Systems", "Networking I & II", "Network Security &

Cryptography", "Management Information Systems", "Database Management Systems" and "Software Engineering and Project Management" before you begin applying for jobs.

- Also, dont just prepare

Mazik Global

- Define yourself? Define yourself in 3 words? Define yourself in 1 word?
- What is your FYP? What's unique in it? What part of it are you working on? [Always a detailed discussion]
- How did you know about the firm?
- What is your past experience if you have any? [Best time to tell them the projects you have made either as a freelancer or voluntarily]
- Where do you see yourself 3, 5 or 10 years from now?

[Note: The above general questions are asked in all the firms, make sure you have an impressive answer for all of the above]

Questions from Database:

- What is an instance of a database?
- What is ERD? How to design an ERD? What is data Redundancy?
- What is a Primary Key, Foreign Key, Unique Key, Artificial Key, Compound Key, Natural Key, Candidate Key?

What is the difference between Procedural Language(C) and OO Language(C++,JAVA,C#)?

C programs follow a procedure of steps written in it, called functions. It follows a top-down approach i.e. much importance is given to flow of program rather than on data on which functions operate. On the other hand, Java/C++ are object oriented languages.

Find Highest Salary

```
SELECT Distinct Max(Salary),EmployeeName FROM Employees;
SELECT EmployeeName,Department FROM Employees ORDER BY Salary DESC Limit 1;
```

Find only the 2nd Highest Salary

```
SELECT Salary FROM Employee Order by Salary DESC Limit 1 Offset 1;
```

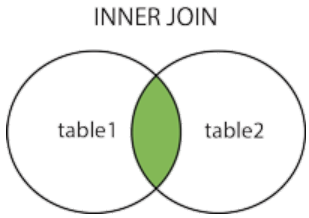
Fetch all the departments from the department table even if no employee works at a certain department i.e. fetch departments even if employees are null:

```
SELECT e.EmployeeName,d.DepartmentName
FROM Department AS d
LEFT JOIN Employee AS e
ON e.EmployeeID=d.EmployeeID;
```

What are Joins? Types of joins, difference between inner and outer join?

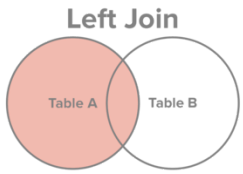
Joins: Joins are used to combine the tuples, records from two tables or more tables if a certain condition is met.
They are basically two types of joins, Inner and outer joins.

Inner Joins: (also known as simple join, natural join)
Inner join returns only those records from the joined tables which completely fulfil the join condition. Basically there are 2 types of Inner Join, the one what is explained already is the first type and most commonly used and the second is EquiJoin whose condition is always the condition of equality.

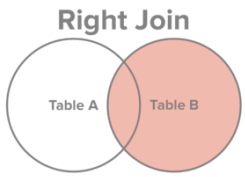


Outer Joins:
There are 3 types of Outer Joins:

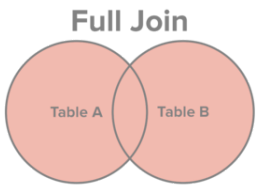
Left Outer Join:
The left outer join returns all rows from the left table, with the matching rows in the right table. The result is NULL in the right side when there is no match.



Right Outer Join:
The right outer join returns all rows from the right table, with the matching rows in the left table. The result is NULL in the left side when there is no match.



Full Outer Join:
Selects all records from Table A and Table B, regardless of whether the join condition is met or not. Null is written in attributes of A if there doesnt exist a record in A for the record of B and vice versa.



There is also one more join called the *self join*, which is used to join a table to itself as if the table were two tables, temporarily renaming at least one table in the SQL statement.

What is Distinct?
Distinct returns only unique values from a column in some table.

```
SELECT DISTINCT City FROM Customers;
```

Questions from OOP:

- What are the pillars of OOP?
- Define Encapsulation, Polymorphism, Abstraction and Inheritance?
- What are the types of Polymorphism? Define Overloading, Virtual Override?
- What are Access Modifiers, how many access modifiers are there in C#? Name them. Explain the functionality of each of them.
- What are the concepts of Inheritance?

- How to Limit a class from further inheritance?
- What are Recursive Functions? What is a stopping condition?

Algorithms:

- Write the program from Fibonacci Series using loops or recursion.
- An array of million numbers perhaps with repetition, devise an algorithm to traverse it and tell the repetitions or perhaps ignore the repetitions with good complexity. (Hint: Use Binary Tree, Hash table)
- A dictionary, and we input it some words like newspaper, laptop words which are made of two or more other words, how to tell after traversing through the dictionary if they are a combination of two or more words?

TPS

Questions from Data structures:

- What is a Linked list and what are its types?
- Explain Linked list insertion?
- How to traverse a link list? What is a sorted linked list and unsorted linked list?
- Can you access a private field or method outside a class boundary? If yes, then how?
- What are friend classes?
- How to create an abstract class in C++ without specifying any keyword?
- If there exists two classes A and B with their respective fields and methods, then how would such a thing be made possible upon making their objects:

```
main(){
A obj1 = new A(); B obj2 = new B();
Obj3 = obj1+obj2;
}
```

- What is operator overloading? How to achieve this in C#?
- Explain the deletion of nodes in binary trees?
- Explain Binary tree properties, searching, insertion?
- What is a Heap? How insertion happens in heap? What is the complexity of heap sort?
- What are Hashtables? How insertion happens in hash tables? What is clustering? Types of clustering? What is the complexity of search in hashtables?
- In C# memory management, what is saved in stack and what is saved in Heap?

How to find the value of middle node, 5th last node, 3rd last node in a linked list?

Take two pointers, Pointer1 and Pointer2, increment Pointer1 by 1 and Pointer2 by 2. When the linked list ends the pointers will not further increment, Value of Pointer1 will give the middle value of the linked list. And 2*Pointer1-nth lastnode will give you 5th or 3rd last node values in a linked list.

What are Collections, Generics?

- Collections are specialized classes for data storage and retrieval. Existing in the System.Collection namespace, they allow various purposes such as allocating memory dynamically to elements or accessing them through indexes. E.g ArrayList, HashTable,Stack,Queue.
- Generics are widely used to make collections classes, they let you to define type-safe data structures. Generics are used to design a code block that is independent of data type. Stack and Queue class in C# are generic i.e. they require a datatype as an input when you try to use them.

What is singleton?How to implement singleton?How to restrict a class from making not more than required objects?

A singleton class allows instantiation of an object only once. Singleton is implemented by making a constructor private and declaring a static method which creates an object and a static variable of the singleton class type. The object creation to 1 is limited by returning the class type variable, the object will only be created if this variable is null. Thus when this method runs for the first time, it finds the

value of class type variable equal to null and assigns an object inside it, but when you try to run the method again, it returns the same object thus limitation is implemented. Code:

```
 class Singleton
    {
        private static Singleton iobject;
        private Singleton()
        {
        }
        public static Singleton Create()
        {
            if (iobject == null)
            {
                iobject = new Singleton(n);
            }
            return iobject;
        }
    }
static void Main(string[] args)
        {
            Singleton s1 = Singleton.Create();
            Singleton s2 = Singleton.Create();

            if (s1 == s2)
            {
                Console.WriteLine("singleton");
            }
            else
                Console.WriteLine("No Singleton");
```

Allow multiple objects but limit the number:

```
public static int num=0;
private Singleton()
        {
            Singleton.num++;
        }
public static Singleton CreateMultiple()
        {
            if (num < 4) //to restrict object creation to at-most 4
            {
                Singleton Temp = new Singleton();
                return Temp;
            }
            return null;
        }
 static void Main(string[] args)
        {
Singleton s1 = Singleton.CreateMultiple();
Singleton s2 = Singleton.CreateMultiple();
      Singleton s3 = Singleton.CreateMultiple();
Singleton s4 = Singleton.CreateMultiple();
Singleton s5 = Singleton.CreateMultiple();
Singleton s6 = Singleton.CreateMultiple();
Console.WriteLine(Singleton.num); //num will display 4 i.e. s5 and s6 couldnt create any
objects
}
```

What is factory?

Factory is one of the most used design patterns, it defines an interface for creating objects by letting the subclasses determine which object to instantiate. That means object creation is done through inheritance, the object creation is requested and not done explicitly

using the new keyword. This allows us to encapsulate the object creation process.
For E.g if you have a document with multiple kinds of pages, i.e. skills page, experience page etc and you want to restrict explicit creation of those pages through the new keyword you use factory interface to create those pages.

How to identify loop in a single linked list?

Assign a boolean value of false to all the nodes of the linked list. Start moving from the head to next node and whenever the next pointer lands on a new node, change the boolean to True after making sure it was false. So if we receive any true in any upcoming node than it is a loop.
Some nodes ahead when the some node's next pointer will point to a previous node, the boolean value of the previous node will be found true already, thus will indicate that the next pointer of current node has returned to a previous node confirming it as a loop.

What is a Queue

Queue is a data structure which works on the first in first out principle, its size is static. for dynamic queue and stack use linked lists. Dequeue is when an element leaves queue from the front end and enqueue is when an element gets in queue from rear. Meaning that entry is done from rear and exit is done from front. There are also queues in which insertion and deletion is done from both ends, they are called Double ended queues.

What is a Priority Queue

Priority queue is a queue on the basis of some priority. Technically, if every entry in a queue has priority 0 then all will be dealt on the FIFO basis, but if an entry with priority 1 comes, then it will be dealt first and the entries with priority 0 will be put to hold. For e.g. there's a printer in a library and students have priority 0 and teacher has priority 1. No matter when the teacher enters the queue, she will use the printer first. But if she has 10000 pages to print this will cause Starvation i.e. students will be starved. Starvation is solved by the concept of Aging, Aging means whenever a low priority task is executed before high priority. For example After every 100 prints, 1 student is allowed to print too. Priority queues are often implemented using heaps.

What are the differences between Array and linked list

1. Array has a fixed size, while linked list is dynamic
2. Elements of an array are independent, while elements in a linked list are connected.
3. Array's elements can be accessed by their index values, while the only way to access members of a linked list is by going node to node through the 'next' link.
4. In array memory is allocated at compile time, while on linked list memory is allocated at run time.

Give real life examples of binary tree(Note that the question isn't about BTS but only binary trees, makes it easier for you to answer generally)

1. Router tables are stored using binary tree in high bandwidth routers.
2. Scheduling processes in many operating systems.
3. A* shortest path algorithm uses binary trees.
4. Binary trees are much more useful when they are self balancing i.e. when they rotate through their root nodes to maintain a height difference between two subtrees of 0 or at-most 1.
5. Hoofman trees are used for compression of data.
6. Hashtrees are used for hashing.
7. Binary trees are used alot for searching by applying binary search tree constraints to them.

Questions from OOP:

- What is a Value type, reference type? [Discussed in detail, always]
- What is Boxing and Unboxing, implicit and explicit casting?
- What are the operations of Garbage collector?
- What is a Destructor? Difference between destructor and Finalizer?
- How is an exception handled? What component handles it?
- What are OOP Pillars? [Discussed in detail, each of them]
- What is static and dynamic binding? Early or Late binding?
- What are the differences between overloading and overriding?
- What is compile time and runtime? Explain
- Access Modifiers, Struct why or class why?
- What are Interfaces[Discussed in detail]
- What are abstract classes?[Discussed in detail]

- What can struct inherit? What can interface inherit?
- Which Access Modifiers can be used with classes?
- What are the Differences between interfaces and abstract classes?

What is .NET framework and what does it provide, its constituents?

.Net Framework is a software framework that supports building and running of windows and web applications. It provides a consistent. Secure. Fast and unconflicted environment for developing applications, its foundation is the CLR and .Net framework class library which contains built in reuseable types to enable accomplishment of common tasks.

What is CLR?

The common language runtime is the foundation of .NET framework. It manages memory automatically, thread execution, code execution, code safety verification, compilation, and other system services. It enforces code access safety using CAS(Code access security) which regulates access to protected resources & robustness using CTS.

What is Metadata?

Metadata describes the data used by your program and enables your code to interact easily with other code. The metadata is contained in the same file as the MSIL.(Microsoft Intermediate Language)

What is CLS?

The common language specification is a fundamental set of language features that are supported by CLR of .NET framework. It ensures type safety of code. CLS represents the guidelines to the compiler of a language. Common Language infrastructure specification also refers to CLS.

What is CIL?

The common intermediate language also known as microsoft intermediate language is a human readable lowest level language which is generated by compiler or ILAssembler. CIL is defined by CLS.

What is CTS?

The common type system defines how types are declared, used and managed in the CLR. It supports CLR in cross language integration. It provides a library that contains the primitive data types.

What are delegates?

Delegates are reference types that serve a purpose similar to that of function pointers in C++. They are used for event handlers and callback functions in the .NET Framework. You can say modern pointers.

What is managed and unmanaged code?

The code that is supported and controlled by the CLS is managed code(C#, VB.NET) and the code that runs outside the CLR is unmanaged code(COM components, ActiveX). In other words the code that is understood by the .Net framework is managed code and the code that is not understood by the .Net framework is unamanaged code.

What are enums?

Enum is a distinct type that contains named constants with an underlying integral(int, long) type. To access the value behind the constants, casting of enum to a integer is necessary. Enum a = {bird, dog, cat}, int n = (int)a.bird

What is the difference between int pointer and char pointer?

The memory allocated for int pointer is 4 bytes while the memory allocated for char pointer is one byte. Int pointer contains memory address of an integer value while char pointer contains a memory address of a character value.

Which data structure supports the counting of a repetitive integer?(Trick Question)

Binary Tree, Heap, Linked List

What is Constructor Chaining?

Constructor Chaining is an approach where a constructor calls another constructor in the same or base class.
https://www.codeproject.com/Articles/271582/Constructor-Chaining-in-Csharp

Differences between Singleton and Static classes:

1. Singleton classes can implement interfaces.
2. Singleton class is instantiated, though only once but Static classes are never instantiated.

3. The design of a static class can be seen as procedural while Singleton design is OO.

Questions from Database:

- What are Triggers?
- What are stored procedures?
- What are indexes, types of indexes? Advantages of indexes or disadvantages?
- What is DDL, DML, DCL and TCL?
- Questions about Queries and subqueries[Any keyword, depicting any situation may be asked]
- What is ERD? What is a database schema? How to define a schema?
- Can you drop an attribute that references another table i.e if a foreign key refers to it?
- What is cardinality?
- What does a group-by clause do?

Normalization:
Normalization refers to the approach of removing redundancy from a database and taking care of insertion, deletion and update anomalies. Anomalies are problems that occur in a poorly planned database. If a database is not normalized then upon update of a certain row from some table, we wont be sure if it is changed in other places where exists or not.This will give rise to update anomaly. Insert anomaly occurs when we cant add a certain attribute in the record without inserting other attributes. And if we delete some attribute then other attributes also get lost because of it, this is deletion anomaly.

1NF:
Values should be atomic(indivisible)

2NF:
1NF+There mustn't exist any partial dependencies, split tables.(For e.g course name, student name shouldnt stay together in one table because they are not fully but partially dependent)

3NF:
2NF+Remove transitive dependencies(multiple attributes dependent on a single attribute) by creating a new table.(For e.g Combine city, address, street, zip in a new table by zip because it is unique)

BCNF:
3NF+For every X->Y, X must be a super key in that relation. (X and Y are attributes)

What are Precompiled Queries?
If a query is repeatedly used in a session. It can be compiled before usage i.e. precompiled and just run from memory when called upon. The more complex the query, the greater the benefit.

Algorithms:

- Program for string manipulation i.e. take a string input as "I aM tALHA" and output as "i Am Talha" i.e. convert lower to upper case and upper to lower case and dont use built in functions
- Program for bracket balancing[Stack application]
- Convert char array with numbers into integer variable. [Input char[] a = {'1','2','3','4'} -> output int a = 1234]
- Write a method which tells output is even or not without using modulus?
- Palindrome function
- String "I love pakistan" to "I evol natsikap".
- A method takes a single number as input, the number is either 3 or 5. When the input is 3 the method returns 5 and when the input is 5 the method returns 3. Note: No if/else, no switch statements, no ternary operators are allowed, infact no construct is allowed except basic math operations. What would be the logic inside the method?

Miscellaneous Questions:

What are web services

A web service is a collection of open protocols and standards used for exchanging data between applications or systems. Software applications written in various programming languages and running on various platforms can use web services to exchange data over computer networks like the Internet in a manner similar to inter-process communication on a single computer.

What is a Kendo?

Kendo UI provides everything you need to build apps with HTML5 and JavaScript. It pulls-together rich UI widgets, a powerful data source, fast templates, simple validation, globalization, data viz, Mobile UI widgets, and much more into a single, easy to use, easy to upgrade package, all based on jQuery. Kendo UI provides extensive collection of rich UI widgets, these are HTML5 controls based on jQuery, supported by all current browsers as well as having broad support for all the browsers.

What is a SOAP?

Simple Object Access Protocol is a communication protocol designed to communicate via Internet. It is an XML-based messaging protocol for exchanging information among computers.

What are Restful Web Services

In REpresentational State Transfer every component is a resource. Rest server provides access to resources and Rest Client accesses and presents the resources. Each resource is identified by URI and resource accessing is done using HTTP methods such as GET, POST,PUT etc. REST services can send or receive data in both XML and JSON form unlike SOAP which can only access the data in XML form, Restful Services are more dynamic. SOAP is a protocol while RESTful is an architecture.

What is Software Development Lifecycle? Describe its stages. [Make sure you go through Software Engineering thoroughly from the internet, this is very important]

SDLC, Software Development Life Cycle is a process used by software industry to design, develop and test high quality softwares.There are many models used for SDLC such as **RAD(Rapid Application Development)** model in which functional modules are developed in parallel and integrated for fast product delivery, **Waterfall model** in which.each phase must be completed before the next phase can begin, **Agile model** in which Iterative approach is taken and working software build is delivered after each iteration. Each build is incremental in terms of features; the final build holds all the features required by the customer. SDLC stages are:

Communication: This is the first stage where a user initiates a request for the software product that he needs.
Requirement Gathering: The software development team meets the stakeholders and gather as much of their requirements as they can.
Feasibility Study: After gathering the requirements, the development team analyzes if the software can be feasible both financially and practically to deliver all the requirements.
System Analysis: The team analyzes the software and depicts a particular software model for the project. The scope of the project is understood.
Software Design: The requirements gathered in the requirement gathering phase are the input to this step. On this stage software data flows, logical diagrams are made and pseudocodes are written.
Coding or Development: This is the programming phase of the software.
Testing: The program has to be tested again and again in order to minimize errors. Early discovery of errors and their remedy is the key to reliable software.
Integration: If the software involves any outside libraries, databases or services, they are all integrated in the integration stage.
Implementation: This stage involves implementing the software on the user machines or implementing them in the user's organization.
Disposition: After a certain period of time the software becomes obsolete, this phase includes archiving data and closing the systems.

What is MVC?

The Model-View-Controller (MVC) is an architectural pattern that separates an application into three main logical components(separation of concerns): the model, the view, and the controller. The model contains your business rules , logics and application data, it is actually the brain of your software, performs manipulation with database. View is the presentation i.e. the layout or forms that are displayed in the UI. Controller controls the communication between model and view. For e.g when a user initiates a request it goes to controller, controller tells model to do the required things and returns the results to the view. The System.Web.Mvc namespace contains classes and interfaces that support the ASP.NET MVC framework. With MVC.NET you can easily create web applications.

What is WCF?

Windows communication foundation is the framework for building service oriented applications. Used when you want to send data asynchronously from one point to another. I.e. creates a communication layer between different platforms. WCF is secure and supports

ajax and REST apis. Its services can be used for secure business transactions, building a realtime chat application that enables data transmission etc.

What is WPF?

Windows presentation foundation is a graphical subsystem by microsoft for rendering user interfaces in windows applications. WPF was previously Avalon and it uses DirectX. It separates UI from business logic and handles the UI part. Both WPF and WCF applications can be build using Visual Studio. Using WPF you can create windows applications with rich UI.

What is a .NET Assembly?

A chunk of (precompiled) code that can be executed by the .NET runtime environment. Assemblies are the building blocks of .NET Framework applications; they form the fundamental unit of deployment, version control, reuse, activation scoping, and security permissions.

What are web sessions?

The session is a data structure that an application uses to store temporary data that is useful only during the time a user is interacting with the application, it is also specific to the user.

What is ASP.NET Session state?

ASP.NET session state enables you to store and retrieve values for a user as the user navigates ASP.NET pages in a Web application.

What is ASP.NET View state?

View state is the method that the ASP.NET page framework uses to preserve page and control values between round trips. When the HTML markup for the page is rendered, the current state of the page and values that must be retained during postback are serialized into base64-encoded strings. This information is then put into the view state hidden field or fields.

Questions from Networking:

What is TCP/IP or connection-oriented protocol?

Transmission Control Protocol is a connection-oriented protocol, which means a connection is established and maintained until the application programs at each end have finished exchanging messages. TCP works with the Internet Protocol (IP), which defines how computers send packets of data to each other. Together, TCP and IP are the basic rules defining the Internet.

What is UDP or connection-less protocol?

User datagram protocol also works with IP to provide a connection less transmission of packets from one end to other end with loss tolerance and low latency. Such a transmission is critical in gaming applications because a maintaining low latency is more important than some packet loss.

What is Cryptography? What's the latest crypto algorithm usually used?

The science of hiding the information through some algorithm to introduce security is called Cryptography. The latest crypto algorithms used are RSA and AES(advanced encryption standard) which is a symmetric block cipher. AES comprises three block ciphers, AES-128, AES-192 and AES-256. Each cipher encrypts and decrypts data in blocks of 128 bits using cryptographic keys of 128-, 192- and 256-bits, respectively.

What is a port number, host, node?

A port is a logical connection place, these ports are assigned with numbers known as port numbers. For the HTTP service, port 80 is defined as a default and it does not have to be specified in the URL. A network host is a computer or other device connected to a computer network which may offer information resources, services, and applications to users or other nodes on the network. A network node is a connection point for data transmissions on a communications network. A host serves many nodes.

What is OSI Model, how many layers are there in it?

The Open System Interconnection (OSI) model defines a networking framework to implement protocols in seven layers.

Physical Layer: Its is the hardware layer. The data is in bits form at this level.
Datalink Layer: Links the two physical layers, wraps packets into frames. The data is in frames form at this level.
Network Layer:Handles the addressing and routing of data, subnets. The data is in packets form at this level.
Transport Layer: TCP and UDP protocols are responsible for error free data transferring from one point to another. The data is in Segment form at this level.
Session Layer: Establishes, manages and terminates connections between applications.

Presentation Layer: Usually a part of OS, encrypting decrypting text.
Application Layer: A layer that provides services for emails, ftp etc.

What is Handshaking?
The process by which two devices initiate communications. Handshaking begins when one device requests for a connection with another device, The other device sends a response which is received and acknowledged by the first device.

What is a server request?
When a client requests a server for some information it is called a server request.

What is a socket? How it works?
Sockets allow communication between two different processes on the same or different machines. A Socket is used in a client-server application framework. Most of the application-level protocols like FTP, SMTP, and POP3 make use of sockets to establish connection between client and server and then for exchanging data. A socket has a typical flow of events. In a connection-oriented client-to-server model, the socket on the server process waits for requests from a client. To do this, the server first establishes an address that clients can use to find the server. When the address is established, the server waits for clients to request a service. The client-to-server data exchange takes place when a client connects to the server through a socket. The server performs the client's request and sends the reply back to the client.

What are the essential thing if we are making a chat application?.

What are Routing Protocols and Switching protocols?
A routing protocol specifies how routers communicate with each other e.g. OSPF, RIP, EIGRIP.
The protocols used for packet switching are switching protocols for e.g. IP, TCP,UDP.

What is a server, client?
A server is an instance of a computer program that accepts and responds to requests made by another program, known as a client. Clients are service requestors. A client does not share any of its resources, but requests a server's content or service function.

What is SSL?
Secure Sockets Layer is a standard security technology for establishing an encrypted link between a server and a client—typically a web server (website) and a browser. SSL secures millions of people' data on the Internet every day, especially during online transactions or when transmitting confidential information because the data transmitted through SSL is encrypted. The browser and the server need what is called an SSL Certificate to be able to establish a secure connection.

Questions from Operating Systems?

Why is linux more secure?
Linux doesn't give standard users access to the root of the system unlike windows where any account can become an administrator and have access to everything. This gives viruses complete control over everything that administrator account can access which is almost everything. In short words, Linux users are less privileged when it comes to access to the root of the system in comparison with windows where users are fully privileged. One other argument about Linux being more secure is that Linux isnt widely used while windows is, Malicious attackers consider targeting a larger, closed and collected group of users. Linux has many distributions and since viruses are computer programs, it would be difficult to target linux systems because of their diverse shells, packages and distributions.

What are VMs?
Virtual machines are emulation of computer systems. It is installed on another software but imitates as a hardware.

What are File systems e.g. in windows, Linux, MAC?
Windows: FAT32(max disk size is 32GB), NTFS(Advanced version of FAT32 allows disk size beyond 32GB), ReFS(Resilient file system, new for windows 8 servers)
Linux: FAT32, Ext2, Ext3 or Ext4 or XFS.
MAC: HFS Plus or HFS+

What is MBR? What's the first thing a computer does after starting?
The Master Boot Record (MBR) is the information in the first sector of any hard disk or diskette that identifies how and where an operating system is located so that it can be boot (loaded) into the computer's main storage or random access memory. The first thing

that computer does is load the BIOS from its chip, BIOS tells it to look for a device to boot from usually a hard disk or CD ROM. The MBR on the hard disk helps it in loading the OS into its main storage.

What is Mutex?

A mutex is a program object that prevents simultaneous access to a shared resource. This concept is used in concurrent programming with a critical section, a piece of code in which processes or threads access a shared resource. Only one thread owns the mutex at a time, thus a mutex with a unique name is created when a program starts. When a thread holds a resource, it has to lock the mutex from other threads to prevent concurrent access of the resource. Upon releasing the resource, the thread unlocks the mutex.

What is Semaphore?

A semaphore is a value in a designated place in operating system (or kernel) storage that each process can check and then change. Depending on the value that is found, the process can use the resource or will find that it is already in use and must wait for some period before trying again.

Difference between Mutex and binary Semaphore?

Describe Linux Kernel mode and User mode.

Kernel mode interacts with the core of the OS i.e. with the root of the system or the hardware. Kernel mode is also known as privileged mode or system mode. Kernel mode is specially for restriction or protection from unauthorized user application program. User mode is the normal mode for operating programs, it is unprivileged mode and if it needs to performs any system related tasks, the user mode has to switch to kernel mode for doing so.

What is a shell?

Shell is a user program or it's environment provided for user interaction. Shell is a command language interpreter that executes commands read from the standard input device (keyboard) or from a file.

What are the ways in which 2 processes can communicate with each other?

What is Virtual Memory?

A computer can address more memory than the amount physically installed on the system. This extra memory is actually called virtual memory. It allows a computer to compensate for shortages of physical memory by temporarily transferring pages of data from random access memory (RAM) to disk storage.

What is Hypervisor?

A hypervisor or virtual machine monitor (VMM) is a computer software, firmware, or hardware, that creates and runs virtual machines. A computer on which a hypervisor runs one or more virtual machines is called a host machine, and each virtual machine is called a guest machine.

What is Mutual Exclusion?

Single unit of execution is process. Two processes are mutually exclusive if they need the same resource but cant use it simultaneously. Mutex and Semaphores are used to implement Mutual Exclusion.

What is interprocess communication?

Processes communicate with each other and with the kernel to coordinate their activities, this is called inter process communication. Linux supports a number of Inter-Process Communication (IPC) mechanisms. Signals and pipes are two of them. I.e signal and pipeline for linux.

Linux and Windows Process State Diagrams

http://www.macdesign.net/capella/it4813/images/stallings-Linux_process-thread_states-f4.18.png
https://fennypotter.files.wordpress.com/2010/10/thred.jpg

How message passing works?

Message passing occurs between two processes that are mutually exclusive. The processes use these primitives: Send(destination, message) Read(source, message). The sender or receiver are either blocking or unblocking.

What is race condition?

A situation in which two or more processes read or write over a same data item and its final state depends upon the relative timing of their execution. The output depends on who finished the race last.

Difference between multiprogramming, multiprocessing and multithreading.

Multiprogramming - A computer running more than one program at a time (like running Excel and Firefox simultaneously)
Multiprocessing - A computer using more than one CPU at a time
Multithreading - Threads sharing a common resource (like 1 CPU) i.e. multiple threads in a single program.

What is ICL, CRL?

ICL is a virtual machine environment, a certificate revocation list (CRL) is a list of certificates (or more specifically, a list of serial numbers for certificates) that have been revoked, and therefore, entities presenting those (revoked) certificates should no longer be trusted.

Differences between Process and Thread:

Threads are considered lightweight because they use far less resources than processes which are considered heavyweight. Threads are easier to create than processes since they don't require a separate address space. A process can consist of multiple threads. Processes are independent and threads are interdependent.

TimeExperts & Wavetec

[OOP, Database and OS questions were asked similar to TPS]

- What is a Class Diagram? Draw it.
- What is aggregation, composition?
- Write program for Anagrams?
- Write a program to find repetitive numbers in an array with good complexity?
- Implement stack class
- Write a power function
- Write a program for converting a string into an int, dont use built in functions.
- Differences between SQL and SQLite?
- Swap values between of two variables without using a third variable.
- Implement a program for printing armstrong numbers till 1000

Diamond problem in interface

Diamond problem occurs when Classes B and C inherit from Class A and a Class D inherits from both B and C. And when the same name method exists in A, B and C, D then upon creation of D's object which method will be called? [Learn the answer yourself by searching]

Sofcom & Efrotech

[OOP, Database and OS questions were asked similar to TPS]

- What is the difference between product based and project based organization? Which one is better and why?
- How does LINQ work? What are its features?
- What are the purposes of ADO.NET?
- What is the purpose of Nullable type?
- Whats the one most basic difference between an Array and an ArrayList?
- What can be developed using WCF, How does it work?
- How does a web service work?
- How many design patterns do you know? If you know any tell what they do?
- What is MSMQ?
- What is type safety in C#?
- What do we mean by the term interoperability?

- What are Asynchronus functions?
- What is entity framework?
- If there are two interfaces A and B that declare the same method public void close(); and a class implements both these interfaces and defines public void close(); in it. Which interface's method will be defined? A's or B's? Or both?

What is NoSQL? What is MongoDB?

A NoSQL is a non relational, unstructured database. MongoDB is a NoSQL database. It supports dynamic schema design. It stores documents in JSON like form.

What are nullable types? How are they declared? What is var?

Nullable types are the types that can be nulled.
< data_type> ? <variable_name> = null;
Int? A = null;
Nullable types have two properties (HasValue-a boolean which is set to true if it contains any meaningful value and false if its null and Value-the value stored in nullable type, either null or some meaningful value.
Var is a dynamic data type, which means the data type of a var variable is decided at run time based on the elements that reside in it. If all the elements are integers the Data type becomes int, if elements are series of characters the data type becomes string.

What is protected internal?

Protected restricts the access to only the inheriting class while internal restricts the usage of the specific method to only the current project or assembly. That means you cant access the method from any other assembly or project even if you try referencing to this method's class.

What is merge sort?

Merge sort is a very good sorting algorithm with worst case complexity of O(nlogn). It divides the array of numbers and keeps dividing it until they cant be further divided. Then it starts to join the numbers in the same manner it broke them, only this time it sorts them while joining them in a sequence.

What does System.LINQ contain?

The System.Linq namespace provides classes and interfaces that support queries that use Language-Integrated Query (LINQ). LINQ is a Microsoft programming model and methodology that essentially adds formal query capabilities into Microsoft .NET-based programming languages.

What is ADO.NET?

ADO.NET is a set of classes that expose data access services for .NET Framework programmers. ADO.NET provides a rich set of components for creating distributed, data-sharing applications.

Can there exist multiple interfaces with the same name?

No

If you have 5 methods in an interface, and you implement only 2 of them in the inheriting class, can you instantiate that class now?

No, you need to implement all methods for the class to be able to instantiate.

What is a difference between functions and sub-routines?

Function returns a value, subroutine does not.

Which function converts a string into lower and uppercase?

String.ToLower, String.ToUpper

What are data adapters in .NET?

DataAdapter in .NET provides communication between the Dataset and the SQL database.

Why is main static?

Main is static because static methods dont need to be instantiated for existing. Since main is the entry point of the program it is available to run when your program starts because of its static nature.

What things are explicitly called and what are implicitly called in C#?

Finalize() is implicitly called by the Destructor. Dispose() is explicitly called for clearing up resources used by an object.

What is SQL Server?

SQL server is microsoft's RDBMS.

What is Silverlight?

Silverlight is a free web browser plugin that enables us to create rich applications and deliver great media experiences on the web.

What does system.net namespace contain?

The System.Net namespaces contain classes that provide a simple programming interface for a number of network protocols, programmatically access and update configuration settings for the System.Net namespaces

What does system.data namespace contain?

The System.Data namespace provides access to classes that represent the ADO.NET architecture. ADO.NET lets you build components that efficiently manage data from multiple data sources.

What does system.io namespace contain?

The System.IO namespace contains types that allow reading and writing to files and data streams, and types that provide basic file and directory support.

What are Crystal Reports?

SAP Crystal Reports is a Business Intelligence tool which is used to generate reports from both SAP and non-SAP data sources. It enables end users to generate reports that includes exceptional visualizations and implement new business requirements into reports to reduce dependency on IT and Report developers.

What are extension methods?

Extension methods enable you to "add" methods to existing types without creating a new derived type, recompiling, or otherwise modifying the original type. Extension methods are a special kind of static method, but they are called as if they were instance methods on the extended type.

Can var be a function's return type?

No, var is an implicitly typed dynamic data type, perceived by the program at compile time. Using var as a return type would present an error.