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Infosys is one company where interviewers are quite friendly and try to make you comfortable. In this blog, we will discuss a lot of questions that are popularly asked in the personal interview (technical) round as well as touch some important HR round questions. HR questions play an important role because unlike many other companies, Infosys filters at least 20-30% candidates after the final HR round too. I wouldn’t say it is easy to crack Infosys interview, but if you have practiced enough, you will be confident. The confidence will surely show in the way you would answer – that’s the attitude interviewer will look for!

**Infosys Interview Questions**

Infosys technical interview is not purely technical. They focus more on overall personality and behavioral aspects – for example, how you respond to different situations (communication), whether you are able to think logically (reasoning), what is your approach to different types of problems (problem-solving) and handling stress (for experienced) are some important factors.

A typical interview will start with an exchange of pleasantries. These can be –

* How are you doing today or how was your day so far?
* Tell about yourself – previous experiences, any specific projects, etc…
* How do you spend your weekends – your hobbies, favorite food, places to hang out, etc…
* What is your favorite programming language?

Even if you choose one particular language as your favorite, the interviewer will touch upon questions around all the languages you have mentioned in your resume. As long as you are clear with the basics, you should be good to go.

Note that this list is compiled based on many interviews and all these questions are not from a single interview. Here are a few typically asked Infosys interview questions –

**Software development**

**Question: What is SDLC?**

**Answer:** Software Development Life Cycle (SDLC) is an end to end process that defines the flow of the development of a project from requirements stage to the maintenance and support stage. The stages in SDLC are requirements analysis, planning, definition, design, development, testing, deployment, and support (maintenance).

**Read more:** [What are different SDLC Methodologies?](https://hackr.io/blog/sdlc-methodologies)

**Question: Do you know what is waterfall model? (experienced candidates)**

**Answer:** Just like waterfalls from top to bottom, this approach follows breaking down of project activities into different phases. Once a stage is completed, the next stage in the sequence is followed. Each stage is dependent on the result of the previous stage.

**Question: Which is the most popular SDLC model? (experienced candidates)**

**Answer:** One of them is the waterfall model. The other is AGILE which is gaining more popularity now because of its continuous iteration methodology that is less prone to errors during production environment.

The interviewer may ask you differences between agile and waterfall models, learn them [here](https://hackr.io/blog/agile-vs-waterfall).

**C & C++ Questions**

**Question: Explain some important differences between C & C++.**

**Answer:** For the interview, you will be checked only for your basic knowledge and key differences like –

|  |  |
| --- | --- |
| **C** | **C++** |
| C is a procedural language, hence there is no concept of classes, objects, inheritance, encapsulation, and polymorphism. | C++ is an Object-Oriented language. Polymorphism, encapsulation and inheritance are the essences of OOPS. |
| Dynamic memory allocation is done through malloc() and calloc() functions | Memory allocation is done using the ‘new’ operator. |
| Main function can be called from any other functions. | Main function cannot be called from any other functions. |
| No operator and function overloading | It is easy to implement function overloading and operator overloading in C++ |
| You cannot run C++ code in C | You can run most of the C code in C++ |
| For input and output scanf and printf functions are used respectively. | Cin and cout are respectively used for input and output. |
| Reference variables, virtual and friend functions are not supported | These are supported fully |
| Exception handling is not supported | Full support for exception handling |

For your own curiosity, you can read [this article](https://hackr.io/blog/c-vs-cpp) to learn in-depth about the differences.

**Question: What are the differences between C++ and Java? Which one do you think is better and why?**

**Answer:** Both are based on OOPS concept. Following are the basic differences –

|  |  |
| --- | --- |
| **C++** | **JAVA** |
| Platform dependent language | You can write the code and run it anywhere. Java is platform-independent. |
| Used for system programming, for example OSs are written in C++. | Used for application programming, like mobile and web-based applications. |
| Supports both pass by value and pass by reference | Can pass variables only by the value |
| Developers can explicitly write code for pointers. | Java uses pointers internally. Developers can’t write programs i.e. there is restricted support for pointers |
| Supports operator overloading | No support for operator overloading |
| Supports multiple inheritances | Doesn’t support multiple inheritances. (can be achieved through an interface) |

When asked your opinion on which is better, there is no right or wrong answer. You can say what you like about C++ or Java more. For example, I don’t like pointers and Java doesn’t have it, so I can vote for Java. On the other hand, C++ supports operator overloading and passing by reference while Java doesn’t, so I can like C++ more because of this flexibility. This question is just to test if you can analyze and weigh the pros and cons of each.

**Question: What is OOPS concept and how is it implemented in C++?**

**Answer:** OOPS (or object-oriented programming) is a programming methodology where an application program is designed considering everything as objects. It makes programming easy. The main oops concepts are –

* **Class –** contains methods and variables. You can use a class by creating objects of the class.
* **Inheritance –** when there are common properties that can be reused, we can create a parent class. The child classes can then inherit the common methods and variables of the parent class. A very common example is the Animal class. If Dog and Lion are two different animals, they can inherit the common methods of Animal like run(), eat() or makeSound(). The sound of Dog and Lion are different, so each will have their own implementation.
* **Polymorphism –** redefine the way the certain thing works using a different implementation. Polymorphism can be achieved using overloading and overriding.
* **Abstraction –** for complex real-time programs, not all the details need to be shown to the user. Through abstraction, we can separate what an object does from how the object works and show only ‘what’ to the user.
* **Encapsulation –** encapsulation is based on the concept of having the data and code into a single unit to hide the internal workings of the code to an end-user. For example, a class encapsulates several member variables and methods that may not be accessible outside the class.

As an extension, the interviewer can ask you to describe each or any of these. You can just explain the basic concept.

**Question: What are Structs and how are they different from Classes?**

**Answer:** Struct is a customized data type that contains other data types. For example,

struct Student {

int rollNumber;

char section;

void getName();

};

* Members of a class are private by default, to make a variable public, we need to add the public modifier. In a struct, by default members are public and if we need any private members, we have to use a modifier.
* A class can be inherited but structs cannot.

**Question: What is a pointer? Give an example.**

**Answer:** Pointer is a variable that stores the address of another variable. Pointers allow passing variables by references using the address. For example –

int a = 23;

int \*ptr = &a;

cout << ptr;

ptr will store the address of a. That means the address of a is the value of ptr.

0x6788f30 0x4563edd81x

When we do \*ptr, we will get the value stored in the address referenced by ptr i.e. 23. \* is called the dereference operator.

**Question: What is the difference between reference and pointer?**

**Answer:** Pointer stores the address of a variable, but the reference is just a copy of a variable with a different name. References have to be initialized, whereas pointer need not be. To initialize pointer, we use the dereference operator,

int a;

int \*ptr = &a;

// We use the & reference operator to initialize reference variable.

int a = 20;

int &ref = a;

In the above, while ptr will store address of a, ref will store the value of a (20). Learn more about references and pointers through [this](https://hackr.io/blog/pass-by-reference-vs-pass-by-pointer) detailed article.

**Question: How is dynamic memory allocation done in C/C++?**

**Answer:** We have covered this answer in question 4 (comparison).

**Question: What are virtual functions?**

**Answer:** Suppose there is a class Customer. It has a function SendEmail() marked as virtual. Now any class that is derived from Customer must have its own implementation of SendEmail() function. Let us say the class PrivilegedCustomer is derived from Customer. PrivilegedCustomer should override the function SendEmail() to provide its own implementation.

Hence, virtual functions are functions that have to be overridden and ensure that the correct method is called.

**Question: Give examples of data structures in C++.**

**Answer:** There are two types of data structures in C++ 🡪 linear and nonlinear.

* **Linear –** data elements are stored in sequence. Example, stack, queue and linked list.
* **Non-linear –** tree and graph that are not stored in sequential manner.

**Question: Tell me one disadvantage of using C++.**

**Answer:**There is no built-in support for threads. If they ask more, you can say it doesn’t support garbage collection.

**Question: What is friend function/class?**

**Answer:**

* **Friend function –** if a function is marked as a ‘friend’ of a particular class, it can access the protected and private members of the class.
* **Friend class –** same as function, if a class is marked as friend of another class, it can access the protected and private members of that class.

Example –

class Student {

private: int roll;

public: friend class Teacher;

};

Class Teacher{

private: float marks;

public: void getRollNumber(Student& stud){

cout << stud.roll;

}

};

More C++ Cnterview Question [Check here](https://hackr.io/blog/cpp-interview-questions).

**Frequently Asked Java Questions**

**Question: How is polymorphism implemented in Java?**

**Answer:** Method overloading or static polymorphism

That means a method with the same name can have different number of parameters. Based on the parameter list, the appropriate method will be called. For example,

**Method overloading**

print(String name){

//code

}

print(int marks, String name){

//code

}

print(String[] subjects, String name){

//code

}

// in the main program,

if(subjects.length >0){

print(String[] subjects, String name);

}else if(marks>0){

print(int marks, String name);

}else

print(String name);

**Overriding or dynamic polymorphism**

This is the case when a child class extends parent class. During run time when the object is created, the appropriate method will be created. You can take the popular PizzaShop example –

class PizzaShop{

void prepareDough(){

System.out.println(“Pizza shop fresh dough ready!”);

}

}

class IndianPizzaShop extends PizzaShop{

void prepareDough(){

System.out.println(“Welcome to IndianPizza, fresh dough is ready!”);

}

}

In the main class,

public static void main(String[] args) {

PizzaShop pizza = new IndianPizzaShop();

pizza.prepareDough();

}

The output will be – Welcome to IndianPizza, fresh dough is ready!

This means that the method prepareDough() is overridden by the child class IndianPizzaShop at runtime.

**Question: What is the difference between stack and heap memory?**

**Answer:**

**Heap –**

* JRE uses it to allocate memory for objects and JRE classes.
* Garbage collection is done on heap memory
* Objects created on heap are accessible globally.

**Stack –**

* Short term references like the current thread of execution
* References to heap objects are stored in stack
* When a method is called, a new memory block is created. Once the method gets executed, the block is used by the next program.

Stack memory size is smaller compared to heap memory.

**Question: Write a program to check if a number is prime.**

**Answer:** Pass the number let us say int number = 47;

// set default to not prime

boolean flag = false;

// prime numbers are divisible only by themselves and 1

for(int i = 2; i <= number/2; ++i)

{

// if no remainder

if(number % i == 0)

{

// number is divisible by i, so it is not prime.

flag = true;

// break the loop if the number is not prime

break;

}

}

// if flag is not equal to true

if (!flag)

System.out.println(number + " is prime.");

else

System.out.println(number + " is not prime.");

**Question: Explain the concept of inheritance.**

**Answer:** Inheritance is a concept where a child class can access the methods of a base class. Inheritance can be achieved by extending a parent class or by using interfaces.

class A{}

class B **extends** A{}

interface C{}

class D extends A **implements** C{}

**Question: How is exception handling done in C++ and Java?**

**Answer:** C++ and Java use the try/catch and throw keywords to handle exceptions. However,

* In Java only the instances of Throwable or subclasses of Throwable can be thrown as an exception. In C++, even primitive types and pointers are allowed to be thrown as an exception.
* Java has finally block which is executed after try-catch block. This block is used to execute some code irrespective of what happens in the code (clean up, clearing variables etc…). there is no such provision in C++.
* To list the set of exceptions a method can throw, Java uses the ‘throw**s**’ keyword, whereas in C++, throw does the job.
* All exceptions are unchecked in C++. Java can have checked and unchecked exceptions.

**Question: What is ‘null’ and how is memory allocation done for null objects?**

**Answer:** When a non-primitive variable doesn’t point or refer to any object, it is called null.

* String str = null; //declaring null
* if(str == null) //Finding out if value is null
* int length = str.length();//using a null value will throw NullPointerException;

**Question: What is the difference between Array and ArrayList?**

**Answer:**

* The array has a fixed length, whereas the size of ArrayList can grow dynamically as elements are added.
* ArrayList does not store primitives. If we have to store int elements, each should be wrapped into Integer objects to be stored in ArrayList. This is not the case with Array.

**Question: Can you write a program to swap two numbers?**

**Answer:**

int temp = 0;

temp = number1;

number1 = number2;

number2 = temp;

**Question: Now write the same (above) program without using temporary variable. Is it possible?**

**Answer:**

Let us say number1 = 10 and number2 = 20;

number1 = number1 + number2; // number1 is now 30

number2 = number1 - number2; // number2 is now 10(number1)

number1 = number1 - number2; // number1 is now 20(number2)

**Question: What is a circular linked list?**

**Answer:** Circular linked list is a list in which each node is linked to the next and the last one (tail) is linked to the first (head), completing a circle.

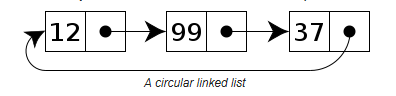


Image source: [Wikipedia](https://en.wikipedia.org/wiki/Linked_list)

**Question: What are the different modifiers in Java?**

**Answer:** public, private, protected and default are the modifiers in Java.

**Question: What is a class? How to create an object? If a class is static, can you create an object?**

**Answer:** Class encapsulates variables of different types and methods that can be clubbed together.

For example,

Class Student can have all the variables and methods related to a student like name, roll number, marks, subjects chosen etc… When an application wants the details of a Student, an object of this class can be created to fetch all the details of the student.

Student student1 = new Student();

In java, only a nested class can be static. A top level (outer) class cannot be static.

public class Outer {

public static class Nested {

}

}

Yes, an object of static class can be directly created in another class without creating an instance of the outer class.

public class Test {

Outer.Nested obj = new Outer.Nested();

}

**Question: What are the different types of loops in Java?**

**Answer:** For loop, While loop, do while loop.

**Frequently Asked Database (SQL) Interview Questions**

**Question: What is a database schema?**

**Answer:** Schema is a logical representation or structure of the entire database. It defines how the data is organized, associated and stored in the database.

**Question: What is RDBMS?**

**Answer:** Relational Database Management System (RDBMS) is a set of programs that helps a developer to interact with the database for creating, updating or deleting data. This is done through queries (SQL). For example, each data element can be a row in the table.

**Question: What is the difference between unique key, foreign key and primary key?**

**Answer:**

**Primary key –** identifies each row in a table. For example, in the student table, student\_id can be the primary key used to access the details of student. student\_id will always be different for different students. Can’t be null.

**Unique key –** set of one or more fields that collectively identify a database record. This should not include the primary key. Unique key can have one null value. For example, student\_name and batch\_number can be collectively used to identify top students in last 3 years.

**Foreign key –** a column that references the column of another table to establish the relationship between two tables. Most of the times, the primary key in one table is the foreign key in another. For example, the book table can have student\_id as a foreign key that will determine the details of the books a student has taken.

**Question: What are clustered indexes?**

**Answer:** Indexes are used to speed the query time to improve performance. Think of it as an index in a book, which makes it easy for you to navigate to a particular page or chapter. Clustered index maintains the physical order of the data in a table. For example, if a clustered index is created on the student\_id column of student table, student with student\_id 5, will be stored as the 5th row and with id 10 will be in the 10th row, irrespective of the order in which the data is inserted.

**Question: What are SQL joins? How to use them to fetch data from multiple tables?**

**Answer:** Joins are used to get results from multiple tables using primary and foreign keys of the related tables. Example –

|  |  |
| --- | --- |
| table – student | table – books |
| student\_id (primary key) | book\_id (primary key) |
| student\_name | book\_title |
| student\_batch | student\_id (foreign key) |
| student\_department | book\_author |

Now, to get the name of the books that a student has taken, we can simply write a query as –

select student.student\_name, student.student\_batch, book.book\_title, book.book\_author from student, book where student.student\_id = book.student\_id;

The results will be –

|  |  |  |  |
| --- | --- | --- | --- |
| student\_name | student\_batch | book\_title | book\_author |
| Karan | 2008 | C++ for beginners | Yashwant Kanetkar |
| Karan | 2008 | Java for dummies | Kathy Sierra |

**Question: What are SQL triggers?**

**Answer:** Triggers are [stored procedures](https://hackr.io/blog/stored-procedures) that are invoked when some event like insert, update or delete happens in the database on a particular table.

For More SQL Interview Questions Read [this Blog Post](https://hackr.io/blog/top-sql-interview-questions).

**Frequently Asked HTML Interview Questions**

**Question: What is the full form of HTML?**

**Answer:** Hypertext Mark-up Language.

**Question: Name some common tags used in HTML.**

**Answer:** <html>, <body>, <img>, <a href>, <title>, <table> etc…

**Question: How can you add a hyperlink in a page?**

**Answer:** We can use <a href> tag to do it. Example –

<a href=”https://hackr.io/blog”> The interesting blogs</a>

**Question: What is the basic structure of html pages?**

**Answer:**

<html>

<head>

<title></title>

</head>

<body>

--main content

</body>

</html>

**Question: What is a frame?**

**Answer:** Frames can divide the html page into separate windows. Each frame is a different html document loaded using ‘src’ attribute.

**HR Questions for Freshers**

**Question: Tell me about yourself.**

**Answer:** You can start with your name, education, previous experiences (If any)

**Question: Some questions from your resume – regarding projects, previous projects etc…**

**Answer:** Take interest to give more details and answer the follow-up questions, if any.

**Question: What is the most difficult challenge you have faced working in a team/project?**

**Answer:** This could be an individual issue like a code problem that you sat on for a couple of days, or an external issue like getting approval for some project.

**Question: What are your strengths and weaknesses?**

**Answer:** Be honest. Support your answers with examples of how you have demonstrated the said strength or weakness. For example, “I can’t switch to another task unless I complete the current one. I have experienced it in previous projects. “

**Question: Why do you think Infosys is a good choice for your career?**

**Answer:** This is a tricky one. As a fresher, your first thought would be to clear any interview that fetches you a job. For this question, you have to do some homework. Go through the Infosys website, read about what they do, find out how your career goals match their vision and talk about that. Tell them how you can grow as an individual in the company while providing your best services to the company.

**Question: What do you know about Infosys?**

**Answer:** Again, you should visit the Infosys, read about their founder, CEO, work culture, infrastructure, the training campus and other interesting information that has attracted you into attending this interview.

**Question: What are your long-term career goals?**

**Answer:** Talk about where you see yourself in the next 5 or 10 years. It can be as simple as buying a new house or seeing yourself as the project head in the Netherlands. This helps the interviewer know about your personal ambitions.

**Question: Why should we hire you?**

**Answer:** You can tell about the values you can bring to the company and the qualities you possess that can help the company grow. For example, you look at a project from a bigger perspective – how will it impact the business, how can any change bring more success to the customer and so on.

Don’t just say you are a team player or a smart-worker. Tell something that is unique to you.

**HR Questions for Experienced Candidates**

The below set of questions can be asked in the technical round also. In that case, you will not have a separate HR round and when you meet the HR, he will directly ask you about your salary expectations and other general stuff. These questions are subjective and there is no right or wrong answer. Everyone has different ways of handling others. The main test here is the communication skills – how transparent and open are you for resolving issues. Would you set up a meeting and calmly explain your points with facts, or would you just sulk and complain? Would you ask for help when you are stuck or get worked up because you want to do-it-all by yourself? These are personal views and you have to build your own answer as these will be a show of your personality.

1. If you have a difference of opinion with your immediate manager, how will you explain your point of view to him?
2. If you had to change one thing in your past, what would that be?
3. If there is a conflict between you and your team member, how will you resolve it amicably?
4. Have you resolved differences between two team members who report to you? How will you do so in the future?
5. Have you handled any teams before? How would you motivate your employees?
6. Let us say your manager gives you a high priority task, your onsite coordinator calls you up and says he wants a task done urgently and your team members are facing a critical issue which needs your immediate attention. What would you do?

All ‘s well that ends well…

Other than these, general questions regarding your salary expectations, work timings, and flexibility, location, a personal profile will be asked. HR will also tell you about the company’s growth, future plans, and overall work culture. Just go with confidence, think positive and be honest. You can crack it!

* [Facebook Interview Questions](https://hackr.io/blog/facebook-interview-questions#Facebook_Interview_Questions)
  + [Question: How will you rotate a square (N x N) matrix by 90 degrees in the anti-clockwise direction without using any extra space?](https://hackr.io/blog/facebook-interview-questions#Question_How_will_you_rotate_a_square_N_x_N_matrix_by_90_degrees_in_the_anti-clockwise_direction_without_using_any_extra_space)
  + [Question: You are given an array with positive numbers. Explain how you will find the largest subset of the array containing elements that are Fibonacci numbers.](https://hackr.io/blog/facebook-interview-questions#Question_You_are_given_an_array_with_positive_numbers_Explain_how_you_will_find_the_largest_subset_of_the_array_containing_elements_that_are_Fibonacci_numbers)
  + [Question: Suppose you have an integer array and a positive integer k. How will you count all distinct pairs with a difference equal to k?](https://hackr.io/blog/facebook-interview-questions#Question_Suppose_you_have_an_integer_array_and_a_positive_integer_k_How_will_you_count_all_distinct_pairs_with_a_difference_equal_to_k)
  + [Question: Can you explain how to find the nth term in Count and Say sequence.](https://hackr.io/blog/facebook-interview-questions#Question_Can_you_explain_how_to_find_the_nth_term_in_Count_and_Say_sequence)
  + [Question: If you are given a string containing uppercase alphabets and integers, how will you print the string with alphabets following the lexicographic order followed by the sum of the integers?](https://hackr.io/blog/facebook-interview-questions#Question_If_you_are_given_a_string_containing_uppercase_alphabets_and_integers_how_will_you_print_the_string_with_alphabets_following_the_lexicographic_order_followed_by_the_sum_of_the_integers)
  + [Question: Convert a roman numeral into its corresponding integer number.](https://hackr.io/blog/facebook-interview-questions#Question_Convert_a_roman_numeral_into_its_corresponding_integer_number)
  + [Question: Find the count of the smallest subarray of a given array with a sum greater than the given value x.](https://hackr.io/blog/facebook-interview-questions#Question_Find_the_count_of_the_smallest_subarray_of_a_given_array_with_a_sum_greater_than_the_given_value_x)
  + [Question: From the given array, find a subarray that has at least k numbers and has the largest possible sum.](https://hackr.io/blog/facebook-interview-questions#Question_From_the_given_array_find_a_subarray_that_has_at_least_k_numbers_and_has_the_largest_possible_sum)
  + [Question: How will you convert a ternary expression to a binary tree?](https://hackr.io/blog/facebook-interview-questions#Question_How_will_you_convert_a_ternary_expression_to_a_binary_tree)
  + [Question: Explain various methods for finding all triplets in an array that has a total sum of 0.](https://hackr.io/blog/facebook-interview-questions#Question_Explain_various_methods_for_finding_all_triplets_in_an_array_that_has_a_total_sum_of_0)
  + [Question: Suppose you are given a binary tree. Explain how you will find its minimum depth?](https://hackr.io/blog/facebook-interview-questions#Question_Suppose_you_are_given_a_binary_tree_Explain_how_you_will_find_its_minimum_depth)
  + [Question: Please explain how you will convert any integer value between 1 and 3999 into its Roman numeral equivalent.](https://hackr.io/blog/facebook-interview-questions#Question_Please_explain_how_you_will_convert_any_integer_value_between_1_and_3999_into_its_Roman_numeral_equivalent)
  + [Question: How will you check whether the given string is K-Palindrome or not?](https://hackr.io/blog/facebook-interview-questions#Question_How_will_you_check_whether_the_given_string_is_K-Palindrome_or_not)
  + [Question: Could you explain how to multiply large numbers represented as strings?](https://hackr.io/blog/facebook-interview-questions#Question_Could_you_explain_how_to_multiply_large_numbers_represented_as_strings)
  + [Question: How will you check that the sum of 2 elements in an array equal to the given number x?](https://hackr.io/blog/facebook-interview-questions#Question_How_will_you_check_that_the_sum_of_2_elements_in_an_array_equal_to_the_given_number_x)
  + [Question: You are given an input stream of N integers that you need to insert in a new stream. How will you find the median of the new stream formed by each insertion of x to the new stream?](https://hackr.io/blog/facebook-interview-questions#Question_You_are_given_an_input_stream_of_N_integers_that_you_need_to_insert_in_a_new_stream_How_will_you_find_the_median_of_the_new_stream_formed_by_each_insertion_of_x_to_the_new_stream)

**Spread the Knowledge**

Cracking a Facebook interview can be a tough pill to swallow. However, with a tight technical preparation and a cool head, you can gain a working opportunity at the world’s biggest social media giant.

**Facebook Interview Questions**

Typically, a Facebook interview process involves:

* **2 telephonic rounds** – Focuses on basic problem solving and data structures
* **2 or 3 coding on-site rounds** – Involves whiteboarding solutions for slightly above average data structures/algorithmic problems. More rounds for the lesser experienced
* **1 or 2 system design on-site rounds** – Aims at gauging the ability of the interviewee in coming up with efficient high-level design architectures for real-life products. The more experienced candidates will face more of these rounds
* **1 cultural fit on-site round** – Meant for evaluating whether the interviewee will be a good cultural fit for Facebook or not. Doesn’t require any technical expertise

While the telephonic rounds will involve questioning about data structures and problem-solving, system design is meant for only a few candidates. So, that leaves with the on-site coding rounds, which are the most important.

Here are 16 most important Facebook interview questions that you can expect coming your way in the coding on-site rounds:

**Question: How will you rotate a square (N x N) matrix by 90 degrees in the anti-clockwise direction without using any extra space?**

**Answer**: Suppose we have the following matrix:

1 2 3  
4 5 6  
7 8 9

Then, rotating it by 90 degrees in the anti-clockwise direction will result in the following matrix:

3 6 9  
2 5 8  
1 4 7

Following deductions can be made after examining the aforementioned resultant matrix:

* The first row of the source matrix will result in the first column of the obtained matrix in the reverse order
* The second row of the source matrix will result in the second column of the obtained matrix in the reverse order  
  .  
  .  
  .
* The last row of the source matrix will result in the last column of the obtained matrix in the reverse order

Any N x N matrix will have floor(N/2) square cycles. For each square cycle, elements in the corresponding cell will be swapped in the anti-clockwise direction; from top to left, left to bottom, bottom to the right, and from right to the top.

For achieving the aforementioned we need nothing more than a temporary variable. Here is how to achieve rotation of an N x N matrix by 90 degrees in the anti-clockwise direction in C++:

#include <bits/stdc++.h>

#define N 4

using namespace std;

void displayMatrix(int mat[N][N]);

void rotateMatrix(int mat[][N])

{

for (int x = 0; x < N / 2; x++)

{

for (int y = x; y < N-x-1; y++)

{

int temp = mat[x][y];

mat[x][y] = mat[y][N-1-x];

mat[y][N-1-x] = mat[N-1-x][N-1-y];

mat[N-1-x][N-1-y] = mat[N-1-y][x];

mat[N-1-y][x] = temp;

}

}

}

void displayMatrix(int mat[N][N])

{

for (int i = 0; i < N; i++)

{

for (int j = 0; j < N; j++)

printf("%2d ", mat[i][j]);

printf("\n");

}

printf("\n");

}

int main()

{

int mat[N][N] =

{

{1, 2, 3, 4},

{5, 6, 7, 8},

{9, 10, 11, 12},

{13, 14, 15, 16}

};

rotateMatrix(mat);

displayMatrix(mat);

return 0;

}

**Output:**

4 8 12 16  
3 7 11 15  
2 6 10 14  
1 5 9 13

**Question: You are given an array with positive numbers. Explain how you will find the largest subset of the array containing elements that are Fibonacci numbers.**

**Answer**: A simple approach for finding out the largest subset of an array of positive numbers that contain Fibonacci numbers is to iterate through all the elements of the array. Then, check for every number whether it is a Fibonacci number or not. If it then adds it to the result.

Although the aforementioned approach is simple, it isn’t efficient. Following steps can be followed for devising an efficient way of achieving the same:

* Find the max in the array
* Generate Fibonacci numbers until the max of the array and store the same in a hash table
* Traverse the array again and add all numbers present in the array and the hash table to the result

Following C++ code demonstrates an effective solution:

#include<bits/stdc++.h>

using namespace std;

void findFibSubset(int arr[], int n)

{

int max = \*std::max\_element(arr, arr+n);

int a = 0, b = 1;

unordered\_set<int> hash;

hash.insert(a);

hash.insert(b);

while (b < max)

{

int c = a + b;

a = b;

b = c;

hash.insert(b);

}

for (int i=0; i<n; i++)

if (hash.find(arr[i]) != hash.end())

printf("%d ", arr[i]);

}

int main()

{

int arr[] = {24, 22, 8, 5, 2, 1, 4, 13, 33};

int n = sizeof(arr)/sizeof(arr[0]);

findFibSubset(arr, n);

return 0;

}

**Output:**

8 5 2 1 13

**Question: Suppose you have an integer array and a positive integer k. How will you count all distinct pairs with a difference equal to k?**

**Answer**: There can be several approaches to achieving the required. We will discuss two of them:

**Approach 1 – Considering All Pairs (NOTE: Will not work for an array with duplicates)**

This basic approach involves considering all pairs in the integer array one by one and checking whether their difference is equal to the given positive integer k or not. If yes, then add them to the result. Following is the implementation of the approach in C++:

#include<iostream>

using namespace std;

int countPairsWithDiffK(int arr[], int n, int k)

{

int count = 0;

for (int i = 0; i < n; i++)

{

for (int j = i+1; j < n; j++)

if (arr[i] - arr[j] == k || arr[j] - arr[i] == k )

count++;

}

return count;

}

int main()

{

int arr[] = {21, 25, 23, 24, 22};

int n = sizeof(arr)/sizeof(arr[0]);

int k = 3;

cout << "Total number of pairs with the given difference is: "

<< countPairsWithDiffK(arr, n, k);

return 0;

}

**Output:**

Total number of pairs with the given difference is: 2

**Approach 2 – Using Sorting**

Another approach of finding the pair count is by using an O(nLogn) sorting algorithm, such as Heap Sort and [Merge Sort](https://hackr.io/blog/merge-sort-in-c). Following steps describe the approach:

* Initialize the count to 0
* Sort the array elements in increasing order
* Eliminate duplicates from the array (if any)
* For each element arr[i]:
* Binary Search for arr[i] + k in the subarray from i+1 to n-1
* If arr[i] + k is found, increment the count
* Return count

Here is the C++ code for implementing the aforementioned approach:

#include <iostream>

#include <algorithm>

using namespace std;

int binarySearch(int arr[], int low, int high, int x)

{

if (high >= low)

{

int mid = low + (high - low)/2;

if (x == arr[mid])

return mid;

if (x > arr[mid])

return binarySearch(arr, (mid + 1), high, x);

else

return binarySearch(arr, low, (mid -1), x);

}

return -1;

}

int countPairsWithDiffK(int arr[], int n, int k)

{

int count = 0, i;

sort(arr, arr+n);

for (i = 0; i < n-1; i++)

if (binarySearch(arr, i+1, n-1, arr[i] + k) != -1)

count++;

return count;

}

int main()

{

int arr[] = {21, 25, 23, 24, 22};

int n = sizeof(arr)/sizeof(arr[0]);

int k = 3;

cout << "Total number of pairs with the given difference is: "

<< countPairsWithDiffK(arr, n, k);

return 0;

}

**Output:**

Total number of pairs with the given difference is: 2

**Question: Can you explain how to find the nth term in Count and Say sequence.**

**Answer**: To begin with, we need to generate all terms from 1 to n. The first two terms are initialized as 1 and 11. The third term is generated from the second, fourth from the third, and so on. To generate the next term, we need to scan the previous term.

While scanning the previous term, we need to keep track of the count of all consecutive characters. For a sequence of the same characters, we will append the count followed by the character to generate the next term.

Here is the C++ code for finding the nth term in Count and Say sequence:

#include <bits/stdc++.h>

using namespace std;

string countnndSay(int n)

{

if (n == 1) return "1";

if (n == 2) return "11";

string str = "11";

for (int i = 3; i<=n; i++)

{

str += '$';

int len = str.length();

int cnt = 1;

string tmp = "";

for (int j = 1; j < len; j++)

{

if (str[j] != str[j-1])

{

tmp += cnt + '0';

tmp += str[j-1];

cnt = 1;

}

else cnt++;

}

str = tmp;

}

return str;

}

int main()

{

int N = 4;

cout << countnndSay(N) << endl;

return 0;

}

**Output:**

1211

**Question: If you are given a string containing uppercase alphabets and integers, how will you print the string with alphabets following the lexicographic order followed by the sum of the integers?**

**Answer**: Here is the step-by-step description of how to achieve the desired:

* Traverse the given string
* (For an alphabet) Increment its occurrence count into a hash table
* (For an integer) Store it separately and add it to the previous sum
* Use a hash table to append all the alphabets first into a string following lexicographic order and then append the sum of the integers at the end
* Return the resultant string

Following code demonstrates implementing the output in C++:

#include<bits/stdc++.h>

using namespace std;

const int MAX\_CHAR = 26;

string arrangeString(string str)

{

int char\_count[MAX\_CHAR] = {0};

int sum = 0;

for (int i = 0; i < str.length(); i++)

{

if (str[i]>='A' && str[i] <='Z')

char\_count[str[i]-'A']++;

else

sum = sum + (str[i]-'0');

}

string res = "";

for (int i = 0; i < MAX\_CHAR; i++)

{

char ch = (char)('A'+i);

while (char\_count[i]--)

res = res + ch;

}

if (sum > 0)

res = res + to\_string(sum);

return res;

}

int main()

{

string str = "AKHIL20BHADWAL24";

cout << arrangeString(str);

return 0;

}

**Output:**

AAABDHHIKLLW8

**Question: Convert a roman numeral into its corresponding integer number.**

**Answer**: We will use the following algorithm for converting Roman Numerals into the equivalent integer number:

* Split the available Roman Numeral string into Roman Symbols
* Convert each Roman Symbol into its equivalent integer value
* For each symbol, starting from index 0:
* (If the current value of the Roman Symbol is greater than or equal to the value of the next Roman Symbol) Add this value to the total
* (If the current value of the Roman Symbol is less than the value of the next Roman Symbol) Subtract this value by adding the value of the next symbol to the total

Following C++ code demonstrates the algorithm:

#include<bits/stdc++.h>

using namespace std;

int value(char r)

{

if (r == 'I')

return 1;

if (r == 'V')

return 5;

if (r == 'X')

return 10;

if (r == 'L')

return 50;

if (r == 'C')

return 100;

if (r == 'D')

return 500;

if (r == 'M')

return 1000;

return -1;

}

int romanToDecimal(string &str)

{

int res = 0;

for (int i=0; i<str.length(); i++)

{

int s1 = value(str[i]);

if (i+1 < str.length())

{

int s2 = value(str[i+1]);

if (s1 >= s2)

{

res = res + s1;

}

else

{

res = res + s2 - s1;

i++;

}

}

else

{

res = res + s1;

i++;

}

}

return res;

}

int main()

{

string str ="MMCDXXII";

cout << "Integer equivalent for the Roman Numeral is: "

<< romanToDecimal(str) << endl;

return 0;

}

**Output:**

Integer equivalent for the Roman Numeral is: 2422

**Question: Find the count of the smallest subarray of a given array with a sum greater than the given value x.**

**Answer**: We will use two nested loops for finding the smallest subarray of a given array with a sum greater than the given value x. While the outer loop will pick a starting element, the inner loop will consider all elements as the ending element.

Each time the sum of the elements present between the current start and end becomes greater than the given number x, the result is updated if the present length is smaller than the previous smallest length.

The approach can be implemented in C++ using the following code:

#include <iostream>

using namespace std;

int smallestSubWithSum(int arr[], int n, int x)

{

int min\_len = n + 1;

for (int start=0; start<n; start++)

{

int curr\_sum = arr[start];

if (curr\_sum > x) return 1;

for (int end=start+1; end<n; end++)

{

curr\_sum += arr[end];

if (curr\_sum > x && (end - start + 1) < min\_len)

min\_len = (end - start + 1);

}

}

return min\_len;

}

int main()

{

int arr1[] = {1, 4, 45, 6, 10, 19};

int x = 51

int n1 = sizeof(arr1)/sizeof(arr1[0]);

int res1 = smallestSubWithSum(arr1, n1, x);

(res1 == n1+1)? cout << "Not possible\n" :

cout << res1 << endl;

return 0;

}

**Output:**

3

**Question: From the given array, find a subarray that has at least k numbers and has the largest possible sum.**

**Answer**: We will first compute the maximum sum until every index is covered and store it in an array named maxSum[]. Next, we will use the sliding window concept of size k. Then we will keep track of the sum of the current k elements.

For computing the sum of the current window, we need to remove the first element of the previous window and add the current element. Once we get the sum of the current window, we will add the maxSum[] of the previous window, if it will be greater than the current maxSum[].

Here is a C++ program for implementing the aforementioned idea:

#include<bits/stdc++.h>

using namespace std;

int maxSumWithK(int a[], int n, int k)

{

int maxSum[n];

maxSum[0] = a[0];

int curr\_max = a[0];

for (int i = 1; i < n; i++)

{

curr\_max = max(a[i], curr\_max+a[i]);

maxSum[i] = curr\_max;

}

int sum = 0;

for (int i = 0; i < k; i++)

sum += a[i];

int result = sum;

for (int i = k; i < n; i++)

{

sum = sum + a[i] - a[i-k];

result = max(result, sum);

result = max(result, sum + maxSum[i-k]);

}

return result;

}

int main()

{

int a[] = {22, 24, -50};

int k = 2;

int n = sizeof(a)/sizeof(a[0]);

cout << maxSumWithK(a, n, k);

return 0;

}

**Output:**

46

The subarray is 22, 24

**Question: How will you convert a ternary expression to a binary tree?**

**Answer**: We will start with traversing the string, making the first character as the root and then:

* Add the next character as the left child of the root (when encountering the ‘?’ symbol)
* Add the next character as the right child of the root (when encountering the ‘.’ symbol)
* Repeat steps 1 and 2 until all elements of the string are traversed

Following is the demonstration of the approach using C++ code:

#include<bits/stdc++.h>

using namespace std;

struct Node

{

char data;

Node \*left, \*right;

};

Node \*newNode(char Data)

{

Node \*new\_node = new Node;

new\_node->data = Data;

new\_node->left = new\_node->right = NULL;

return new\_node;

}

Node \*convertExpression(string str, int & i)

{

Node \* root =newNode(str[i]);

if(i==str.length()-1) return root;

i++;

if(str[i]=='?')

{

i++;

root->left = convertExpression(str,i);

i++;

root->right = convertExpression(str,i);

return root;

}

else return root;

}

void printTree( Node \*root)

{

if (!root)

return ;

cout << root->data <<" ";

printTree(root->left);

printTree(root->right);

}

int main()

{

string expression = "a?b?c:d:e";

int i=0;

Node \*root = convertExpression(expression, i);

printTree(root) ;

return 0;

}

**Output:**

a b c d e

**Question: Explain various methods for finding all triplets in an array that has a total sum of 0.**

**Answer**: There can be three different ways in which we can find all triplets in an array with a total sum of 0. Let’s discuss them in a brief:

**Method 1** – The simplest approach will be to run three loops. Each triplet of the array will be checked whether the sum of their elements is 0 or not. If found, then print the triplets otherwise, print no triplets found. The time complexity for this approach will be O(n3).

**Method 2** – This method makes use of hashing. While iterating through each element arr[i] of the array, we will find a pair with the sum -arr[i]. The time complexity for this approach will be O(n2).

**Method 3** – The third method involves using sorting and will require an extra space. Although the time complexity of this method will be O(n2), compared to the O(n) auxiliary space required by the other two methods, this method only requires O(1) auxiliary space. This method works in the following steps:

* Sort all elements of the given array
* Run loop from i=0 to n-2
* Initialize two index variable l = i+1 and r = n-1
* While (l<r), check the sum of arr[i], arr[l], and arr[r] then:
* If the sum is less than zero then l++
* If the sum is greater than zero then r–
* If the sum is zero then print the triplet and do l++ and r–

Following C++ program implements Method 3:

#include<bits/stdc++.h>

using namespace std;

void findTriplets(int arr[], int n)

{

bool found = false;

sort(arr, arr+n);

for (int i=0; i<n-1; i++)

{

int l = i + 1;

int r = n - 1;

int x = arr[i];

while (l < r)

{

if (x + arr[l] + arr[r] == 0)

{

printf("%d %d %d\n", x, arr[l], arr[r]);

l++;

r--;

found = true;

}

else if (x + arr[l] + arr[r] < 0)

l++;

else

r--;

}

}

if (found == false)

cout << " Not found!" << endl;

}

int main()

{

int arr[] = {10, -10, 0, 42, -43, 1};

int n = sizeof(arr)/sizeof(arr[0]);

findTriplets(arr, n);

return 0;

}

**Output:**

-43 1 42  
-10 0 10

**Question: Suppose you are given a binary tree. Explain how you will find its minimum depth?**

**Answer**: The approach to finding the minimum depth of a binary tree involves traversing the given binary tree. For each node, check if it’s a leaf node:

* If yes, then return 1
* If no, then:
  + Recur for the right subtree if the left subtree is NULL
  + Recur for the left subtree if the right subtree is NULL
  + Take the minimum of the two depths if both the left and right subtrees are not NULL

Here is an implementation of the aforementioned approach using C++ code:

#include<bits/stdc++.h>

using namespace std;

struct Node

{

int data;

struct Node\* left, \*right;

};

int minDepth(Node \*root)

{

if (root == NULL)

return 0;

if (root->left == NULL && root->right == NULL)

return 1;

if (!root->left)

return minDepth(root->right) + 1;

if (!root->right)

return minDepth(root->left) + 1;

return min(minDepth(root->left), minDepth(root->right)) + 1;

}

Node \*newNode(int data)

{

Node \*temp = new Node;

temp->data = data;

temp->left = temp->right = NULL;

return (temp);

}

int main()

{

Node \*root = newNode(1);

root->left = newNode(2);

root->right = newNode(3);

root->left->left = newNode(4);

root->left->right = newNode(5);

root->left->left->left = newNode(6);

root->left->left->right = newNode(7);

cout <<"The minimum depth of the given binary tree is: "<< minDepth(root);

return 0;

}

**Output:**

The minimum depth of the given binary tree is: 2

**Question: Please explain how you will convert any integer value between 1 and 3999 into its Roman numeral equivalent.**

**Answer**: Following algorithm will be used for converting any integer value between 1 and 3999 to its Roman numeral equivalent:

* Compare the given number with base values 1000, 900, 500, 400, 50, 40, 10, 9, 5, 4, and 1 in the respective order
* The value that will be the closest, smaller or equal, will serve as the initial base value
* Now, divide the given number with the initial base value
* The corresponding Roman Symbol for the initial base value will be repeated quotient times, while the remainder will follow Step 1
* The process will be iterated until the remainder becomes 0

The algorithm can be implemented in C++ using the following code:

#include <bits/stdc++.h>

using namespace std;

int sub\_digit(char num1, char num2, int i, char \*c)

{

c[i++] = num1;

c[i++] = num2;

return i;

}

int digit(char ch, int n, int i, char \*c)

{

for (int j = 0; j < n; j++)

c[i++] = ch;

return i;

}

void printRoman(int number)

{

char c[10001];

int i = 0;

if (number <= 0)

{

printf("Invalid number");

return;

}

while (number != 0)

{

if (number >= 1000)

{

i = digit('M', number/1000, i, c);

number = number%1000;

}

else if (number >= 500)

{

if (number < 900)

{

i = digit('D', number/500, i, c);

number = number%500;

}

else

{

i = sub\_digit('C', 'M', i, c);

number = number%100 ;

}

}

else if (number >= 100)

{

if (number < 400)

{

i = digit('C', number/100, i, c);

number = number%100;

}

else

{

i = sub\_digit('C','D',i,c);

number = number%100;

}

}

else if (number >= 50 )

{

if (number < 90)

{

i = digit('L', number/50,i,c);

number = number%50;

}

else

{

i = sub\_digit('X','C',i,c);

number = number%10;

}

}

else if (number >= 10)

{

if (number < 40)

{

i = digit('X', number/10,i,c);

number = number%10;

}

else

{

i = sub\_digit('X','L',i,c);

number = number%10;

}

}

else if (number >= 5)

{

if (number < 9)

{

i = digit('V', number/5,i,c);

number = number%5;

}

else

{

i = sub\_digit('I','X',i,c);

number = 0;

}

}

else if (number >= 1)

{

if (number < 4)

{

i = digit('I', number,i,c);

number = 0;

}

else

{

i = sub\_digit('I', 'V', i, c);

number = 0;

}

}

}

printf("The Roman Numeral equivalent for the given number is: ");

for (int j = 0; j < i; j++)

printf("%c", c[j]);

}

int main()

{

int number = 2422;

printRoman(number);

return 0;

}

**Output:**

The Roman Numeral equivalent to the given number is: MMCDXXII

**Question: How will you check whether the given string is K-Palindrome or not?**

**Answer**: We will start with finding the longest palindromic subsequence of the given string. If the difference between the aforementioned and the given string is less than or equal to k, then the given string will be k-palindrome, otherwise, it will not be.

We can use the following C++ program to check whether a given string is K-Palindrome or not:

#include <bits/stdc++.h>

using namespace std;

int lcs( string X, string Y, int m, int n )

{

int L[m + 1][n + 1];

for (int i = 0; i <= m; i++)

{

for (int j = 0; j <= n; j++)

{

if (i == 0 || j == 0)

L[i][j] = 0;

else if (X[i - 1] == Y[j - 1])

L[i][j] = L[i - 1][j - 1] + 1;

else

L[i][j] = max(L[i - 1][j], L[i][j - 1]);

}

}

return L[m][n];

}

bool isKPal(string str, int k)

{

int n = str.length();

string revStr = str;

reverse(revStr.begin(), revStr.end());

int lps = lcs(str, revStr, n, n);

return (n - lps <= k);

}

int main()

{

string str = "abvcdeca";

int k = 3;

isKPal(str, k) ? cout << "Yes" : cout << "No";

return 0;

}

**Output:**

Yes

**Question: Could you explain how to multiply large numbers represented as strings?**

**Answer**: We will start by multiplying the last digit of the second number with the first number, followed by multiplying the second last digit of the second number with the first number, and adding the two. The process will continue until all digits of the second number are done.

Here’s how to achieve the same in C++:

#include<bits/stdc++.h>

using namespace std;

string multiply(string num1, string num2)

{

int n1 = num1.size();

int n2 = num2.size();

if (n1 == 0 || n2 == 0)

return "0";

vector<int> result(n1 + n2, 0);

int i\_n1 = 0;

int i\_n2 = 0;

for (int i=n1-1; i>=0; i--)

{

int carry = 0;

int n1 = num1[i] - '0';

i\_n2 = 0;

for (int j=n2-1; j>=0; j--)

{

int n2 = num2[j] - '0';

int sum = n1\*n2 + result[i\_n1 + i\_n2] + carry;

carry = sum/10;

result[i\_n1 + i\_n2] = sum % 10;

i\_n2++;

}

if (carry > 0)

result[i\_n1 + i\_n2] += carry;

i\_n1++;

}

int i = result.size() - 1;

while (i>=0 && result[i] == 0)

i--;

if (i == -1)

return "0";

string s = "";

while (i >= 0)

s += std::to\_string(result[i--]);

return s;

}

int main()

{

string str1 = "24224620578";

string str2 = "98055650629857338077";

if((str1.at(0) == '-' || str2.at(0) == '-') &&

(str1.at(0) != '-' || str2.at(0) != '-' ))

cout<<"-";

if(str1.at(0) == '-' && str2.at(0)!='-')

{

str1 = str1.substr(1);

}

else if(str1.at(0) != '-' && str2.at(0) == '-')

{

str2 = str2.substr(1);

}

else if(str1.at(0) == '-' && str2.at(0) == '-')

{

str1 = str1.substr(1);

str2 = str2.substr(1);

}

cout << multiply(str1, str2);

return 0;

}

**Output:**

2375360932037220733184397148506

**Question: How will you check that the sum of 2 elements in an array equal to the given number x?**

**Answer**: We can use the following algorithm for checking whether the sum of 2 elements in an array equals the given number x or not:

* Sort the given array in decreasing order
* Initialize two index variables:
* l = 0 to the leftmost index
* r = ar\_size-1 to the rightmost index
* While l<r:
* Return 1, if A[l] + A[r] == sum
* l++, if A[l] + A[r] < sum
* Otherwise r–
* Continue looping step 3 until all elements in the array are exhausted

Here is a C++ program demonstrating the aforementioned approach:

#include <bits/stdc++.h>

using namespace std;

bool hasArrayTwoCandidates(int A[], int arr\_size, int sum)

{

int l, r;

sort(A, A + arr\_size);

l = 0;

r = arr\_size - 1;

while (l < r)

{

if(A[l] + A[r] == sum)

return 1;

else if(A[l] + A[r] < sum)

l++;

else // A[i] + A[j] > sum

r--;

}

return 0;

}

int main()

{

int A[] = {24, 42, 22, -68, 100, -81};

int x = 32;

int arr\_size = sizeof(A) / sizeof(A[0]);

if (hasArrayTwoCandidates(A, arr\_size, n))

cout << "The array has two elements with the given sum!";

else

cout << "The given array doesn't have two elements with the given sum!";

return 0;

}

**Output:**

The given array has two elements with the given sum!

**Question: You are given an input stream of N integers that you need to insert in a new stream. How will you find the median of the new stream formed by each insertion of x to the new stream?**

**Answer**:

**The Input** – The first line of the input contains an integer N that represents the total number of elements in the stream. Next N lines contain integer x that represents the number to be inserted into the stream.

**The Output** – For each of the element added to the stream print the floor of the new median in a new line.

For the output to be correct we need to follow two constraints;

* N is greater than or equal to 1 and less than or equal to 106
* x is greater than or equal to 1 and less than or equal to 106

An example:

**Input:**

4 (Number of elements i.e. N)  
5\*  
15\*  
1\*  
3\*  
\* = The elements of the stream

The output will be:

5  
10  
5  
4

**Explanation:**

5 goes to stream -> median 5 (5)  
15 goes to stream -> median 10 (5, 15)  
1 goes to stream -> median 5 (5, 15, 1)  
3 goes to stream -> median 4 (5, 15, 1, 3)

That sums up the list of the 16 most important Facebook interview questions. Hope these questions will help you crack your upcoming Facebook interview. All the best!

Check out these [best C++ tutorials](https://hackr.io/tutorials/learn-c-plus-plus?ref=blog-post)!

* [The process](https://hackr.io/blog/tcs-interview-questions#The_process)
* [Technical Interview Tips](https://hackr.io/blog/tcs-interview-questions#Technical_Interview_Tips)
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  + [Final word](https://hackr.io/blog/tcs-interview-questions#Final_word)

**Spread the Knowledge**

TCS is a great place to start as well as grow your career. It offers a friendly and positive ambiance for both individual and company growth. With operations in about 46 countries, TCS recruits a large pool of candidates and the main qualities they look for in a candidate are the aptitude and the attitude.

**The process**

If you are a fresher, you will have to pass through 3 rounds of interviews – sometimes 4. There will be a written test (aptitude test), group discussion, technical interview and an HR round. TCS also opts in for phone interview for screening purposes.

Are you from CS, IT or MCA background? Then you will be asked questions on C, C++, OOPS, SDLC and perhaps Java. If not, you will be asked questions about your final year project and the technical knowledge you acquired during college days. They will ask you if you are comfortable with any programming language (maybe C or OOPS) and ask you a few basic questions. Be prepared to write at least recursion, factorial, LCM, GCD, swapping numbers and palindrome programs apart from the list of questions we have below.

Though they do prefer candidates with 75% or above, if you have a minimum score of 65% with no arrears, you can apply for the interview.

If you are hopping from another company, you will have one or two rounds of technical interview followed by HR discussion. There may be more than one interviewer and you will be asked questions on various topics from your resume.

**Technical Interview Tips**

While aptitude (written test) and group discussion somewhat depend on luck too, the technical and HR rounds are totally in your control. TCS interview questions are thorough and test you on your concepts as well as coding ability. It is important to be well prepared and do some coding practice before going for the written test/interview.

**TCS Interview Questions**

Here are some common questions asked in the technical round of TCS interview. Note that not all questions are from a single interview. This list is a collection of TCS Interview questions from different interviews.

[Which is your favorite or strongest programming language?](https://hackr.io/blog/best-programming-languages-to-learn-2019-jobs-future)

Rather than favorite, mention the language you will be most comfortable with because they will ask you more questions on the language you mention. It can be C, C++, Java, SQL or anything of your choice.

**Question-Related to SDLC**

**Question: What do you know about SDLC?**

**Answer:** Software Development Life Cycle (SDLC) describes the entire process of application development from its requirements analysis to maintenance. There are 5 stages – requirement analysis, design, development, testing & deployment, and support or maintenance.

**Question: Are you familiar with the various SDLC methodologies?**

**Answer:** There are 6 models –

* **Waterfall model (most common and traditional) –** a sequential phase by phase approach, for example, after the requirements phase, the design phase is taken up and then the next and so on.
* **V-shaped –** Same as the waterfall, but there is a testing phase after each development phase.
* **Iterative –** A quick way to build the basic product. Even when complete requirements are not known, you can start development. The process is repeated to improve and accommodate more requirements.
* **Spiral –** Similar to iterative but allows for more refinement as the project goes through all the stages in a spiral until it is complete.
* **Big bang –** The development starts with minimal knowledge of requirement, thus requires little planning. It is suitable only for small projects that involve less risk.
* **Agile –** Currently, the most preferred method, the project is delivered in phases, and the customers, developers, testers and onsite coordinators work in tandem. Each new release is like a continuous development over every previous release.

Check here the [Top SDLC Methodologies](https://hackr.io/blog/sdlc-methodologies)

**Question-Related to HTML**

**Question: What is metadata? What is its purpose?**

**Answer:** Metadata stores information about the data that the HTML document stores. This is done using the <meta> tag. Metadata can store information like keywords, page description, last modified date and can be used by browsers, web services, and search engines.

**Question: Write a simple HTML to get the username as input and submit the value entered.**

**Answer:**

<html>

<form action="/someaction.jsp">

Username:

<input type = "text" name = "username">

<input type = "submit" value="Submit">

</form>

</html>

You can explain the main tags like <form>, <input type> and the action.

**Question: Name few tags that do not need closing tags.**

<br>, <img>, <input>, <hr>

**Question: What is a style sheet?**

**Answer:** It is a file that describes the layout of an HTML document or web page. For example, the color of a text, margins, spacing, fonts, size etc, everything comes under stylesheet. The most common format is CSS (Cascading style sheets).

**Question: What is a marquee?**

**Answer:**

It is an HTML element that causes text or image to scroll up, down, left or right automatically. Example, a news flash where text moves horizontally on the screen.

**Question: Create a table with 3 rows and 2 columns with a black border.**

**Answer:**

<table border = '1 px solid black'>

<tr>

<td>1</td>

<td>2</td>

</tr>

<tr>

<td>5</td>

<td>8</td>

</tr>

<tr>

<td>11</td>

<td>12</td>

</tr>

</table>

**Question-Related to C**

**Question: Who developed C?**

**Answer:** C was originally developed by Dennis M. Ritchie.

**Question: Can you write a program to find if a number is prime?**

**Answer:** Check out the answer in [this](https://hackr.io/blog/infosys-interview-questions) article.

**Question: What is a dangling pointer?**

**Answer:** A pointer that points to a free or deleted memory location is called dangling pointer.

**Question: Is C platform independent?**

**Answer:** C compiler has to be compiled differently for different OS, hence C is platform dependent.

**Question: Explain the different storage classes in C.**

**Answer:** There are 4 storage classes –

* Auto – the default storage class for variables declared inside a function/block. Cannot be accessed outside the block or function where they are created.
* Register – the functionality is same as auto, however the compiler stores register variables in the register of the microprocessor for faster access. If no free register is available, memory space is utilized.
* Static – these are declared only once and the value is retained throughout the scope.
* External – using the extern keyword of external storage class, allows the same variable to be re-used and re-assigned. If a global variable has been assigned a value, that can be overwritten by using extern for the variable inside another function/block.

**Question: Write a simple program to print the average marks of a student.**

**Answer:** int marks[5] = {20, 30, 40, 50, 60};

int length = sizeof(marks)/sizeof(int);

double sum = 0;

for(int i=0; i<length; i++)

{sum += marks[i];}

double average = sum/length;

printf("Average marks = %lf", average);

Read about different data types in C from [this nice blog](https://hackr.io/blog/C-data-types).

**Question: What is the difference between struct and union data types?**

**Answer:** In union, the total memory space allocated to the union is the member with the largest size. Space is shared by other members. The union can store only one value at a time. Structs can contain different types of data without compromising on the memory space.

**Question: Explain the difference between pass by value and pass by reference using a simple program.**

**Answer:** This [detailed blog](https://hackr.io/blog/pass-by-reference-vs-pass-by-pointer) explains all about pass by value and pass by reference with simple examples.

**Question: What are the data structures in C?**

**Answer:** Arrays, stacks, queues, linked lists and trees are the data structures in C. Read more about data structures from this [tutorial page](https://hackr.io/tutorial/data-structures-geeks-for-geeks?ref=blog-post).

**Question: What are directives? What are ifdef, define and endif?**

**Answer:** Directives tell the compiler to preprocess the code before compilation. These preprocessor directives start with the hash(#) symbol to indicate the same. The most common pre-processor directive is #include that we use in all our programs.

#ifdef and #endif – are conditional compilation directives that help in compilation of certain code if the condition is satisfied. If not, the particular code block will not be compiled.

define - #define directive is used to define a macro in the program. For example,

#define LENGTH 3

LENGTH can then be used anywhere in the program.

**Question: What do you mean by the ‘size of’ operator?**

**Answer:** Size of operator returns the size of an operand. The operand can be a data type or an expression. For example, sizeof(int) will return 4, which is the memory allocated to integer data type. Same way sizeof(array)/sizeof(int) will return the length of the elements in an integer array.

**Question: Consider a union as**

union sample{

int a;

float b;

char c[6];

}u;

In the main function, if you print the size of the union, what will you get?

**Answer –** We will get the size of the character array as that is the maximum space allotted to the union.

**Question-Related to OOPS (Object Oriented Programming)**

**Question: Explain the main concepts of OOPS.**

**Answer:** The main concepts of OOPS are an abstraction, inheritance, encapsulation, and polymorphism. You can give one-liner about each and when asked more, give more details. Watch [this video](https://www.youtube.com/watch?v=SS-9y0H3Si8" \t "_blank) for a quick overview of OOPS concepts.

**Question: What is the difference between function overloading and function overriding?**

**Answer:** Overloaded functions have the same name but a different number or type of arguments. For example,

float add(int a, int b);

float add(int a, int b, int c);

float add(float a, int b);

The actual method to be called is decided by the compiler during compile-time based on the parameters that are passed.

In function overriding a base, implementation is overridden by the child class. During run-time, based on the type of object instantiated, the appropriate method (child or parent) is called. For example, if a parent class A and child class B both contain method displayInfo(), and the object is created as A a = new B(); the method of B will be called.

**Question: Do you know any design pattern based on the concept of polymorphism?**

**Answer:** Factory pattern is one of the most common patterns that uses polymorphism. You will find [this](http://www.thedevpiece.com/cdi-polymorphism-and-the-factory-pattern/" \t "_blank) blog very useful in understanding factory pattern in a simple way. You can also get the Head-First Design patterns book to understand all the design patterns (it is a super interesting topic).

**Question-Related to C++**

**Question: What are some of the differences between C and C++?**

**Answer:** [This direct link](https://hackr.io/blog/infosys-interview-questions" \l "Question_Explain_some_important_differences_between_C_C) will take you to some important differences.

**Question: What is modularity? How is it done in C++?**

**Answer:** A modular program is one which has been split into smaller modules, and each module performs only one task (function) or a set of small functions/tasks. We can implement modularity using OOPS concepts like encapsulation.

**Question: Tell the main difference between bubble sort, merge sort and insertion sort.**

**Answer:** The interviewer won’t expect you to tell the whole algorithm. You should just know the concepts and difference.

* **[Bubble sor](https://hackr.io/blog/bubble-sort-in-c)t –** Simple sorting algorithm where two neighboring elements are compared at a time and swapped if the 1st is larger than 2nd.
* **[Merge sort](https://hackr.io/blog/merge-sort-in-c) –** Break the big array into smaller arrays of a single element. Now, sort the arrays while merging them.
* **Insertion sort –** There are two arrays. Elements from the unsorted array are taken one by one and inserted into the second array in a sorted manner.

**Question: What is a null pointer? How is it different from void pointer?**

**Answer:** Null pointer is used for assigning the value of null or 0 to a pointer variable i.e. a pointer that is not pointing to anything. The variable can be of any data type (int, char, float, long etc…). The void pointer does not associate any data type. It can store the address of a variable of any data type.

**Question: What is the use of friend function?**

**Answer:** Friend function of a class can access private and protected members of the class.

If there are two classes say Student and Teacher, and if Student class’s getMarks() function is declared as a friend function in the class Teacher, it can access the private members of the class Teacher.

**Question: How is memory allocation done in C++? Is it the same in C?**

**Answer:** Using new() operator. In C, it is done using malloc() and calloc() methods.

**Question: What is the difference between ++i and i++ operation?**

**Answer:** If the ++ sign comes before the index, the index is incremented first and then an operation is performed. If the ++ sign is put after the index, the index is incremented after the operation. For example,

int i = 0;

cout << ++i;

cout << i++;

both will print the value as 1.

**Question: Explain linked lists and queues.**

**Answer:** Both are data structures in C++.

* **Linked list –** In a linked list, each element is linked to the next one using a pointer. The last element on the list points to null. The first element is called a head. Each element contains data and the link to the next element in the list. [Watch this video](https://hackr.io/tutorial/linked-lists-made-easy?ref=blog-post) to learn more about linked list.
* **Queue –** Queue is a FIFO (first in first out) mechanism. It is similar to our line in ATM counter where the first customer goes in and comes out first. That means, when the queue is full, the oldest element is flushed out first.

**Question: What is a pure virtual function?**

**Answer:** Pure virtual function or an abstract function doesn’t have any implementation. We just declare it. The classes that are derived from the abstract class implement the pure virtual function. We can declare pure virtual function by assigning a value of 0 to it.

**Question-Related to Java**

**Question: What is meant by platform dependence?**

**Answer:** In some languages like C, the compilation of code depends on the operating system. That means the code built on one machine can work only on that type of machine and not anywhere else. This is called platform dependence. In languages like Java, the code can be built once and run anywhere irrespective of the OS or machine. That is why Java is platform-independent.

**Question: Explain the difference between an interface and an abstract class.**

**Answer:** A class can implement many interfaces (multiple inheritances) but can extend only one abstract class. Interface methods are not implemented. The implementation is up to the application developer. Abstract classes can have a default implementation of common behaviors.

**Question: What are JVM and JIT?**

**Answer:** Java code can be executed anywhere because the code is converted from Java bytecodes into the native code of a machine. This is achieved by the JVM (Java Virtual Machine).

A file is compiled only for the first time until it is changed later. If the byte-code is not changed, JVM, the intelligent processor will not waste time compiling such files again. This is called as JIT or Just In Time compilation.

**Question: Is there a do-while loop in Java? How is it different from while?**

**Answer:** Yes. In do-while loop, the condition inside while is checked after the statement is executed, hence the statements are executed at least once in the code, whereas in while, the condition is first checked and only if it is true, the statements are executed.

**Question: Will this code compile?**

byte a = 10;

byte b = 12;

byte result = a + b;

System.out.print(result);

If no, what should you do to make it work?

**Answer:** The statement will not compile. The result a+b has to be typecasted to byte as the default answer 22 will be an integer. The correct code will be –

byte result = (**byte**) a + b; or **int** result = a + b;

**Question: What is the expected output of this code?**

System.out.print("Hello");

System.out.println("World");

Follow up – What should you change to print both in different lines?

**Answer:** The answer is HelloWorld. We should use print**ln** method to print in a new line.

**Consider an array as –**

char [] str={'j', 'a', 'v', 'a'};

How would you print the individual characters of the array?

We can use the java.util.Arrays.toString(str) to get the desired result.

**Question: What is a NullPointerException?**

**Answer:** If we try to use a null value for any operations, java throws a null pointer exception. For example,

String str = null;

str.compareTo(“java”);

A dot operation will throw NullPointerException.

**Question: How is garbage collection done in Java?**

**Answer:** Java easily boasts of the in-built garbage collection done by the JVM. When new() operator is used, the garbage collector allocates memory space. If the object is no longer used, the garbage collector automatically frees up the space used by the object and reuses it for further allocation.

**Question: Suppose there are two processes A & B, is there a way that they can send messages to each other?**

**Answer:** Java processes can communicate with each other using threads. Threads enable multi-tasking by completing more than one tasks in parallel without interfering in each other’s data.

Few other questions from database and cloud (for those who know these) –

**Question: What is a database schema?**

**Answer:** Schema is a logical view of the entire database structure. It represents the distribution and organization of data and the relations between them through tables, constraints, primary and foreign key constraints and so on.

**Question: What are the integrity rules defined in a DBMS?**

**Answer:** There are 2 main types of integrity rules – entity integrity (every table must have a primary key) and referential integrity (foreign key is usually a primary key of some other table and can be null).

**Question: Can you write a nested query?**

**Answer:** You can write any nested query that you know. Here is one for example,

SELECT student\_id,AVG(marks)

FROM students

GROUP BY student\_id

HAVING AVG(marks)>

(SELECT MAX(AVG(min\_marks))

FROM marks

WHERE subject IN

(SELECT subject\_id FROM subjects

WHERE branch\_id

= 'ECE')

GROUP BY subject\_id);

that will get the list of students who got marks greater than average marks in all the subjects for the specified department.

**Question: What is mutual exclusion?**

**Answer:** Mutual exclusion is a way to prevent deadlock by preventing access to a resource by multiple processes at the same time (concurrently). A thread holds a resource and it is locked. The other threads wait till the resource is released.

**Question: What do you know about cloud computing?**

**Answer:** Cloud computing is the availability of resources like data storage and computing requirements on-demand over the internet. The data is centrally located in huge data centres so that it is always available to the end users. All the services, infrastructure, software and platform are available as services stored on a shared computing environment. Some major players are AWS from Amazon, Azure from Microsoft and Google’s cloud platform.

For some of the subjective questions like the last one, you might know more but stick to a short answer unless you are asked for more details by the interviewer.

The questions can be tweaked but this is the overall gist. The questions are tricky and you have to be careful about understanding the questions clearly. The interview will be of average difficulty level and will test your subject knowledge as well as overall attitude towards work. Once you clear technical round, you could be taken to another technical round or an HR round. Some typical HR questions are –

1. Tell me the most interesting thing about yourself.
2. General questions about your hobbies and interests.
3. What do you know about TCS?

For this question, read through TCS website, their recent achievements, their position in the global market and their vision and mission.

1. Do you like programming? (If you are not from CS background). Why did you choose IT line for career and not your core subject?
2. What are your strengths and weaknesses?
3. Can you work in shifts? Will you be able to relocate?
4. If your manager asks you to do a task you do not like (or is against your ethical principles), but promises you a hike or promotion based on that, will you do it? If yes, why? If no, how would you avoid it?
5. Do you have any other offers in hand?
6. If you are the leader of your project, what qualities do you think you should possess?
7. If the status of your project is red (danger), how would you motivate your team to work more without getting stressed out?

Some of these questions are subjective and there is no right or wrong answer as long as you have a justification for the same. These will be a test of your patience, handling stress and tough situations at work.

**Final word**

You will find loads of overwhelming information on the internet. Different candidates have different experiences and they share it on the net. But the key is to be well-prepared with what you have written in your resume and to accept if you do not know any of the answers. There is no shortcut to clearing TCS interview. If you don’t know one answer, don’t get nervous or confused, the interviewers judge you on overall performance and not just one or two questions. Be honest, be confident and most importantly, be cool, so that you can remember the answers you have prepared. All the best!