

goals and objectives along with regular [upskilling](#) of the individual activities.

People are nervous about changes as change disturbs the status quo, but you need not worry as the system design interview questions discussed in this article will help you easily crack your [dream job](#) related to system design.

Tech companies are obsessed with system design interview questions as it assists them in deciding the core potential of a candidate well-suited for the job. Basics should always be kept in mind; thus, preparing the basic design principles and planning answers might provide an edge to you during the interview.

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Top System Design Interview Questions and Answers

1. What is system design?

The process of defining the elements of a system, such as architecture, [product designs](#), modules, interface, and the data for the system dependent on pre-defined observations. The application of systems theory to product development is one of the applications of systems design in real life.

2. What is load balancing, and why is it important in system design?

The distribution of traffic across multiple servers simultaneously in a server farm as a core networking solution is termed load balancing. Load balancers play a significant role in system design as they allow easy traffic flow without any server overload. They improve application

The ability to handle a large amount of traffic in any application is referred to as scalability, whereas performance is about testing the speed with which the application is running. The increased performance is directly proportional to the number of resources added to the system. The ability to handle larger data sets in the event of growing work makes scalability directly related to the performance of any design. Performance problems might affect just one user, whereas the system might eventually become slow in case of scalability issues due to heavy data load.

4. How do you approach system design?

To perfectly design any system, the following things must be kept in mind-

- The system should be robust, re-usable, and well-documented.
- It should be user-friendly and helpful to people.
- The system should be well-ranked and placed well based on the reviews of the users.
- The system can store user data for further inquiry depending upon the area's population density.
- The design process should be smooth and avoid any complications.

5. Which is the primary tool for structured design?

Structure chart is the primary tool for structured design as the chart helps in conceptualizing the problem into simple graphed charts containing various organized elements. A picture or a chart is easier to understand than written data; therefore, pictorial representation in the form of a chart is necessary.

6. In the system design process, what is meant by requirements determination?

It is the basic review exercise that helps study the improvements required in the existing system by doing a detailed study of the existing process. Requirements determination helps the designer beware of any faults and provides remedies to resolve any deficiencies in the design process.



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7. What are the types of documentation in system design?

The types of documentation required in system design are-

- Requirements documentation
- Source code documentation
- System documentation
- Program documentation
- Quality Assurance documentation
- Software architecture documentation
- Operations documentation
- Users documentation

8. Can you name some metrics for measuring system performance?

Some of the key application metrics to measure system performance are-

- User satisfaction/ Apdex scores
- Average response time
- Throughput analysis
- Availability of the system
- Error rates
- Request rate
- Latency and Server CPU checking



9. What are the various consistency patterns available in system design?

With the use of multi-servers, the demand for consistency increases rapidly due to increased system users. But it is difficult to write data to different servers. With multiple and repetitive tasks of writing data to multiple servers, consistency should be ensured while data is written to each server.

The various consistency patterns in system design are-

1. **Eventual Consistency**- Under this pattern, after every data is written, the reads will be seen eventually within milliseconds. DNS and emails are a perfect example of such a consistent pattern in real life.
2. **Strong Consistency**- When data is written, readers will see it under this pattern. There is synchronous replication of data, often referred to as a strict consistency pattern. RDBMS and file systems run under this pattern.
3. **Weak Consistency**- Under this pattern, after every write, the reads may or may not see it. Different nodes can return different values, and weak consistency is not bound by rules, unlike strong and eventual consistency. Real-time uses like video chat, VoIP, real-time multiplayer games, etc., run on a weak consistency pattern, as the users might not receive the information for a while due to system failure or other connected factors that might affect the functioning.

10. How do you design a recommendation system?

Recommendation systems are helpful to the users as they help them find the best alternatives and thereby increase efficiency by allowing more choices to the people. A recommendation system is majorly designed based on the popularity of the products amongst the users.

Systems that contain the desired features and are free from common problems faced by the users are some major qualities to be kept in mind whilst designing a recommendation system.

11. What are the critical aspects of the system study?

System study is vital for developing any system. The three essential aspects of system study are as follows:

- Identification of issues and defining new goals



12. What is the difference between Horizontal and vertical scaling?

Horizontal scaling adds more computers to the network, including memory workload and processing across a distributed network and devices. In layman's terms, additional servers are added to the existing count, and the workload is distributed across devices for efficient processing.

Vertical scaling is the process of upgrading the resource capacity by increasing RAM, adding processors, etc. It can help improve the capability of the server without a code change.

Category	Horizontal Scaling	Vertical Scaling
Load Balancing	Load balancing is required for distributing the traffic across multiple locations	Load balancing is not applicable
Failure Resilience	Application failure resistant, traffic is rerouted to other servers in case of a server failure.	It is prone to failure as the dependency is on one machine. Any loss here will fail the entire application.
Machine Communication	As this involves multiple machines, it's necessary to have network communication	It involves interprocess communication within the machine, making this faster
Data Consistency	The possibility of data inconsistency is higher because this involves different machines for handling other requests, which might result in data being	As vertical scaling involves only one machine, there is no control with data inconvenience

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Limitations	As this scaling requires multiple servers, this has a direct impact on budget and space. You can scale the application as per the business need	If the resources are scaled over the limit, then the application might crash and result in downtime
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13. How will you design an application programming interface rate limiter?

A service to be designed or a tool developed to monitor the request per a window of time a service agrees to allow. If the bid exceeds the rate limit blocks all the additional calls. In addition to the above, the following points will have to be considered while implementing the API rate limiter (Github):

- Consider limiting the request sent to API in a defined time, i.e., the number of requests per second
- The APIs are available over a group of servers; hence rate limiter should work for a distributed setup
- Handling of Soft and hard throttling also should be thought through

14. How do you design a web crawler like Google, and what points to be considered while designing the crawler?



These crawlers should be designed to search a specific file in a set of directories, which involves time and research. You will have to consider finding a new web page to have a better crawler. You should prioritize the dynamic changing web page, and the crawlers shouldn't be boundlessly attached to the same domain.

15. Differentiate between sharding and partitioning.

Sharding is the practice of splitting a single dataset among many databases and storing these in multiple workstations. The system storage capacity can be increased by dividing the larger datasets into smaller parts and stored in many data nodes. Shared databases can accept more requests than a single system by dividing the data among multiple machines.

Partitioning is the practice of separating sorted database objects into distinct portions. You can improve the performance, controllability, and availability by partitioning an extensive database. Partitioning can enhance performance when accessing a partitioned table in specific instances.

Sharding	Partitioning
Sharding is otherwise called horizontal partitioning.	A partition is a logical database split into separate, independent portions. The partitioning of databases is commonly used for load balancing, performance, manageability, and availability
Increased Read/Write throughput – Dataset distributed across several shards increases the capacity	Partitioning includes the benefit of vertical partitioning as well as involving dividing the scheme of the database
Increased storage capacity – Increasing the shards allows scalability, directly impacting high storage capacity	
High availability – If the entire shards go	



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FAQs

1. What is the average salary of system design engineers in India?

As per [Glassdoor India](#), the national average salary of system design engineers is Rs 17 Lakhs per year.

2. What are some of the top firms that recruit for the System Designer position?

Some top firms which recruit system design engineers are Philips, Data Patterns, GE Healthcare, TCS, Aarti Industries, AVL, etc.

3. What is system design?

System design is the process of designing and defining the interface, modules, and data for a system to meet certain specified requirements. System design helps achieve organizational goals and objectives along with regular upskilling of the individual activities.

4. How do I prepare for a systems design interview?

System design interviews are conducted in an accessible form, unlike coding interviews. To crack the design interview, you will have to master three areas.



3. Designing distributed systems

5. Is system design a code?

System design and coding are two different domains. Programmers who know how to apply system design are good.

6. Are freshers asked system design questions?

Freshers are not asked questions related to system design. The system design questions are for experienced candidates. The companies expect you to know high-level system design in detail after 4+ years of experience.

7. What is CDN system design?

A Content Delivery Network (CDN) is a geographically distributed group of servers that work together. It gives a quick transfer of static content like files, images, and videos.

Conclusion

These System design interview questions and answers will assist you and help you secure your dream job. An edge over others is what people want, and these questions will grant you an added advantage over other system designers. These system design interview questions and answers will help you better understand concepts and, thereby, help you better apply such concepts to group discussion topics during your interview.

Having sound knowledge in system design can help you get your dream job in some of the leading companies across the globe. To explore further, we highly recommend going through our [Post Graduate Program in Full Stack Web Development](#) which will help you strengthen your skills and expertise.

If you have any questions or queries, feel free to put them down in the comments below. Our team of experts will review them and get back to you at your earliest.

