



12 Essential Components of Every System Design

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1. Load balancers

In a large distributed system with multiple servers, a load balancer may be used to distribute incoming requests among the servers to ensure that the system can handle a high volume of traffic.

Examples include HAProxy and NGINX.

2. Web server

This is the computer or server that hosts the web-based system and responds to requests from clients.

The web server serves up web pages and other content to clients that request it.

3. Cache

A cache is a temporary storage location that is used to store frequently accessed data in order to improve performance. Caches may be used at various points in the distributed architecture to improve the speed and responsiveness of the system. Examples include Memcached and Redis.

4. Application server

An application server is responsible for executing business logic and delivering content and resources to client applications. Application servers physically or virtually sit between database servers storing application data and web servers communicating with clients.

5. Database server

Most web-based systems store data in a database, which is a structured collection of data stored on a server. The database can be queried by the web server to retrieve and store data as needed.

6. Distributed messaging systems

- These are used to send messages between distributed components of a system.
- Examples include Apache Kafka and RabbitMQ.

7. Distributed file systems

- These are file systems that are designed to store and manage files across a group of servers.
- Examples include HDFS (Hadoop Distributed File System) and Ceph.

8. API

An API, or application programming interface, is a set of protocols and tools that allow different systems or components to communicate with each other. In a web-based system, an API may be used to allow the web application to access data or functionality from other systems or services.

9. Content delivery networks (CDN)

A CDN, or content delivery network, is a distributed network of servers that are used to deliver web content to users based on their geographic location. CDNs can help improve the performance and availability of a web-based system by storing copies of the system's content on servers that are closer to the users.

10. Cloud infrastructure

Many web-based systems are hosted on cloud infrastructure, which refers to a network of servers and storage resources that are provided by a third-party cloud computing provider. Cloud infrastructure can provide the resources and scalability needed to support a large and growing web-based system.

11. Notifications and alerts

Web-based systems may include features that allow them to send notifications or alerts to users, such as emails, push notifications, or text messages. These notifications can be used to keep users informed about important events or updates within the system.

12. Full-text search

Full-text search enables users to search for specific words or phrases within an app or website. When a user queries, the app or website returns the most relevant results. To do this quickly and efficiently, full-text search relies on an inverted index, which is a data structure that maps words or phrases to the documents in which they appear.

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