

# HLD - 1



## HLD - 1



Abhishek Singh  
1st August, 2023

## High-Level Design:

High-Level Design (HLD) is the process of creating an abstract representation of a system that captures its key components, modules, and their interactions. It serves as a blueprint for the system's architecture, allowing stakeholders to understand the system's structure and functionality at a high level.

1. **Fundamental Knowledge:** This includes identifying the primary objectives of the system, understanding user requirements, and defining the core functionalities it must provide.
2. **Key Characteristics/Tradeoffs:** In this category, designers consider the key characteristics and tradeoffs of the system. These may include performance, scalability, security, maintainability, and cost-effectiveness.
3. **Actual Components:** Designers define the actual components and modules that make up the system, their responsibilities, and their interactions with each other.
4. **Actual Tech:** Finally, the high-level design involves selecting specific technologies, platforms, and frameworks that will be used to implement the system.

## Client-Server Architecture:

Client-Server Architecture is a computing model where client devices (such as computers, smartphones, or tablets) request services or resources from a central server. The server processes these requests and sends back the required information or services to the clients. This architecture is widely used in various applications, including web services and cloud computing.

### DNS Server:

A DNS (Domain Name System) server is a fundamental component of the internet that translates human-readable domain names (like [www.example.com](http://www.example.com)) into IP addresses (like 192.0.2.1). When users enter a domain name in their web browser, the DNS server resolves it to the

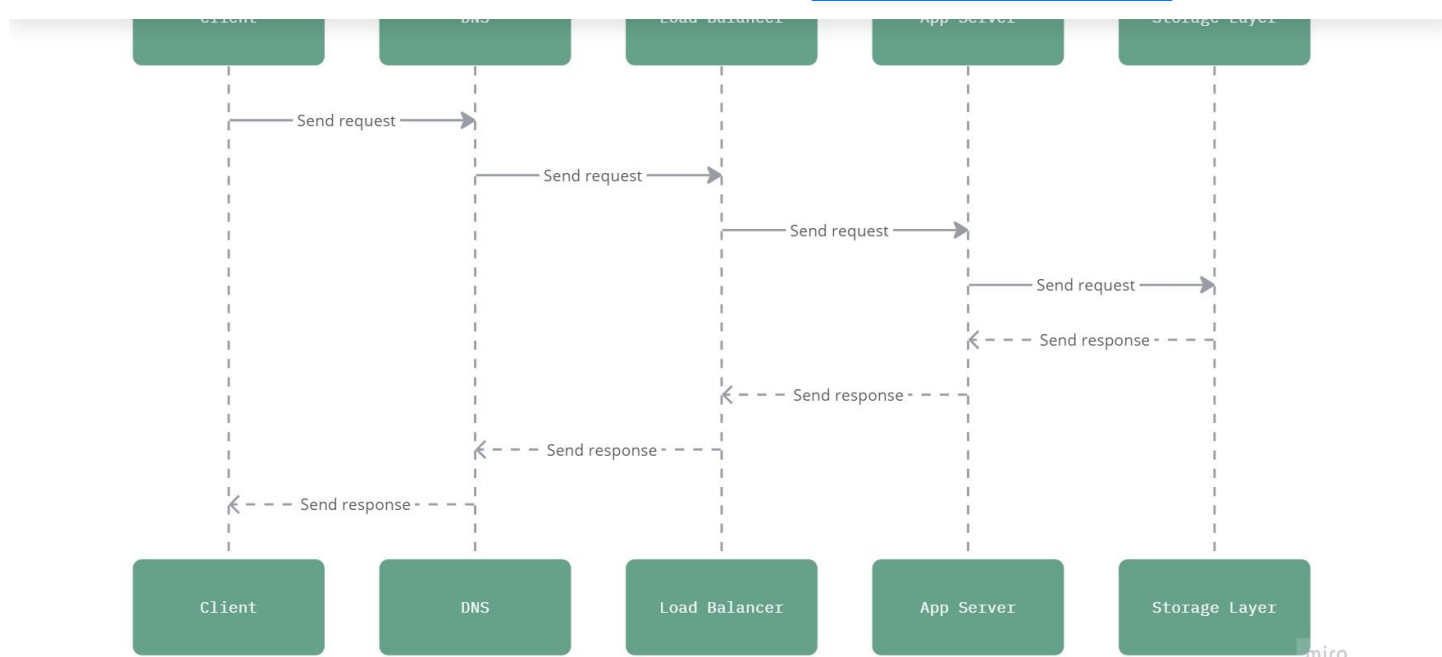
## Load Balancer:

A Load Balancer is a device or software that distributes incoming network traffic across multiple servers in a server farm or data center. Its primary purpose is to ensure that no single server is overwhelmed with requests, thus improving the performance, reliability, and availability of the system. Load balancers use various algorithms to distribute the traffic, such as round-robin, least connections, and weighted distribution.

## Vertical Scaling and Horizontal Scaling:

- **Vertical Scaling:** Vertical scaling involves increasing the resources (e.g., CPU, RAM) of a single server to handle increased demand. It typically requires upgrading the server's hardware or adding more powerful components. Vertical scaling is limited by the hardware's capabilities and may result in higher costs for more powerful machines.
- **Horizontal Scaling:** Horizontal scaling involves adding more servers to distribute the workload and handle increased demand. It allows the system to handle a larger number of requests by distributing the load across multiple servers. Horizontal scaling is more flexible and cost-effective as it can be achieved by adding commodity hardware.

## The flow of Data and Requests in the System



1. The client initiates a request by entering a domain name in the browser.
2. The client's system checks its local cache for the corresponding IP address. If not found, it sends the request to the DNS server.
3. The DNS server resolves the domain name to the IP address and sends it back to the client.
4. The client connects to the load balancer using the resolved IP address.
5. The load balancer distributes the incoming request to one of the available application servers in the server farm.
6. The selected application server processes the request and interacts with the storage layer to fetch or store data if needed.
7. The application server sends the response back to the client through the load balancer and DNS server if necessary.

## CDN (Content Delivery Network):

A Content Delivery Network (CDN) is a network of servers strategically distributed in various locations worldwide. Its purpose is to deliver content,

user's geographical location, reducing latency and improving the website's performance and availability.

## Static and Dynamic IP:

- **Static IP:** A static IP address is a fixed, permanent IP address assigned to a device or server. It remains constant over time and is manually configured by a network administrator. Static IPs are useful for hosting services and applications that require a consistent IP address.
- **Dynamic IP:** A dynamic IP address is temporary and assigned dynamically by a DHCP (Dynamic Host Configuration Protocol) server whenever a device connects to a network. Dynamic IPs change periodically, and the same device may get a different IP each time it connects to the network. Dynamic IPs are commonly used for devices that don't require a fixed address and for conserving IPv4 address space.

Assessment: <https://www.bosscoderacademy.com/blog/hld-1-assessment>

