

## HTTP (HyperText Transfer Protocol)

- A protocol belongs to the Application layer of the TCP/IP model.
- The protocol to transfer data over the web.

### Key Properties

#### 1. Connectionless:

- The connection between client and server terminates after the response from the server.
- **Advantages:** Saves resources by not maintaining connections.
- **Disadvantages:** Inefficient for multiple requests from the same client.
  - HTTP Keep Alive can preserve the connection for a period of time.

#### 2. Stateless:

- The server does not retain information about the client (very scalable; any server can respond to any client).
- To maintain a stateful connection, information is stored using:
  - **Cookies:** Key-value data stored in the client's browser (e.g., login info, items in shopping carts).
  - **Sessions:** Information stored on the server, offering more security but with potential server-side overhead.

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## HTTP Message Structure

- **Request Line:** URI, method
- **Status Line (status code)**
- **Header:** Key-value
- **Blank Line** (Divides the header and body)
- **Body** (Usually empty except for POST requests)

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## Common Status Codes

- **200:** Success
- **4xx:** Client-side errors (e.g., 404 - Not Found)
- **5xx:** Server-side errors (e.g., 500 - Internal Server Error)

## HTTPS (HyperText Transfer Protocol Secure)

- HTTP protocol with enhanced security through **SSL/TLS encryption**.

### Encryption Protocols

- **SSL (Secure Socket Layer)**: Original encryption protocol for secure communications.
  - **TLS (Transport Layer Security)**: The modern, upgraded version of SSL.
  - SSL/TLS operates between the **Application layer** and **Transport layer**.
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### Connecting to a Webpage: Process Overview

1. **DNS Resolution:**
  - The user-entered URL is resolved by the **Domain Name Server (DNS)**, which returns the corresponding IP address.
2. **TCP/IP Connection and HTTP Request:**
  - The browser establishes a connection using the provided IP address and sends an **HTTP request**.
3. **Server Response:**
  - The web server processes the request and replies.
4. **Content Display:**
  - The browser displays the response content.