

OSI Model – Layerwise Roleplay

Simulating Data Transmission Through OSI Layers

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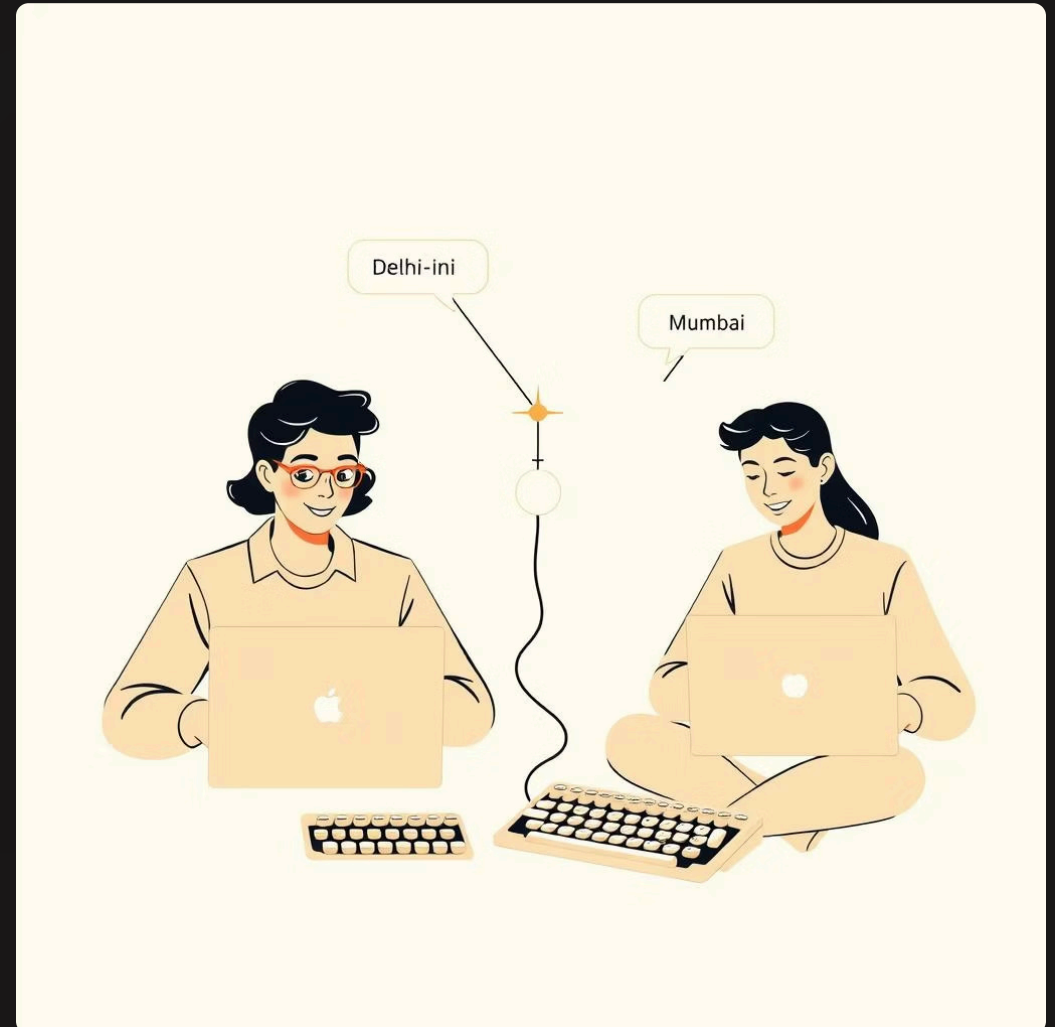
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Scenario: Sending a Message

Imagine Lakshya in Delhi sends a simple "Hello" message from his laptop to Bhavish in Mumbai using an instant messaging app like WhatsApp.

How does this digital greeting travel across such a vast distance, passing through unseen layers of technology?

Let's trace this message's journey through each layer of the OSI Model!



Layer 7 – Application Layer

1

Role

Provides user interface and enables access to network services.

2

Action

Lakshya types "Hello" into WhatsApp and taps "Send". The application layer initiates the communication process.

3

Analogy

Writing a letter and handing it to a courier service. The sender interacts directly with the letter.

Layer 6 – Presentation Layer

1

Role

Responsible for data formatting, encryption, and compression, ensuring data is readable by the receiving application.

2

Action

WhatsApp encrypts the "Hello" message with end-to-end encryption for security and compresses it to optimize transmission.

3

Analogy

Translating the letter into a secret code and neatly folding it for secure and efficient delivery.

Layer 5 – Session Layer

1

Role

Manages communication sessions, establishing, maintaining, and terminating connections between applications.

2

Action

This layer establishes and maintains a stable session between Lakshya's WhatsApp application and Bhavish's WhatsApp application.

3

Analogy

Initiating a phone call – keeping the communication line open and active so both parties can converse without interruption.

Layer 4 – Transport Layer

1

Role

Ensures reliable data transmission, managing error checking, flow control, and segmentation (TCP/UDP).

2

Action

The "Hello" message is broken into smaller, manageable packets. The transport layer ensures each packet reaches Bhavish safely and in the correct order.

3

Analogy

Sending a package with tracking – you receive confirmation of delivery, ensuring the package arrived intact.

Layer 3 – Network Layer

1

Role

Handles logical addressing (IP addresses) and routing, determining the best path for data across networks.

2

Action

This layer uses Bhavish's IP address to decide the most efficient route for the message packets to travel from Delhi to Mumbai.

3

Analogy

Addressing an envelope and choosing the delivery route – selecting whether it travels by road, air, or rail for optimal speed.

Layer 2 – Data Link Layer

1

Role

Frames the data for transmission, handles MAC addressing, and performs error detection within the local network segment.

2

Action

Adds the physical (MAC) addresses of Lakshya's and Bhavish's devices, preparing the data for its journey across the local network.

3

Analogy

Placing the letter into a specific courier truck designated for a particular area code, ensuring it reaches the correct local distribution center.

Layer 1 – Physical Layer

1

Role

Transmits raw bits over a physical medium (e.g., cables, Wi-Fi, fiber optics), dealing with hardware specifications.

2

Action

The digital bits of the "Hello" message are converted into electrical signals or radio waves and then physically sent across the internet infrastructure.

3

Analogy

The physical road or railway track over which the courier truck travels, representing the actual medium of transport.